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Management of Household and Small-Quantity-Generator Hazardous Waste in the United States

Duxbury (Dana) and Associates, Andover, MA

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16. ABSTRACT

The International Solid Waste and Public Cleansing Association (ISWA), an international nongovernmental organization comprising twenty-seven national organizations of waste management professionals, conducted a survey to obtain information regarding household and small-quantity-generator hazardous wastes. This report presents the U.S. response to this survey. The questionnaire covered five different areas: 1) problems, 2) policy approach, 3) technical and organizational aspects, 4) case studies, and 5) treatment and disposal research and development. Comments were also invited. The appendices include the ISWA Questionnaire, a table and other information regarding State laws and regulations governing household hazardous waste, and a listing of the permanent household hazardous waste collection programs operating in 1988. A glossary of acronyms is presented at the end of the report.

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by

Dana Duxbury and Associates
Corporate Office Centers
Andover, Massachusetts 01810

Contract No. 68-02-4279

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FOREWORD

Today's rapidly developing and changing technologies and industrial products and practices frequently carry with them the increased generation of materials that, if improperly dealt with, can threaten both public health and the environment. The U.S. Environmental Protection Agency is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. These laws direct the EPA to perform research to define our environmental problems, measure the impacts, and search for solutions.

The Risk Reduction Engineering Laboratory is responsible for planning, implementing, and managing research, development, and demonstration programs to provide an authoritative, defensible, engineering basis in support of the policies, programs, and regulations of the EPA with respect to drinking water, wastewater, pesticides, toxic substances, solid and hazardous wastes, and Superfund-related activities. This publication is one of the products of that research and provides a vital communication link between the researcher and the user community.

This report presents the results of a survey conducted by the International Solid Waste and Public Cleansing Association (ISWA). The survey was designed to collect information on household hazardous wastes and on hazardous wastes produced by small-quantity generators. Its intent was to provide a means of snaring mutual problems and experience and to promote cooperation among the various responsible and interested parties.

For further information, contact the Waste Minimization, Destruction, and Disposal Research Division of the Risk Reduction Engineering Laboratory.

E. Timothy Oppelt, Director
Risk Reduction Engineering Laboratory

ABSTRACT

The International Solid Waste and Public Cleansing Association (ISWA), an international nongovernmental organization comprising 27 national organizations of waste management professionals, conducted a survey to obtain information regarding household and small-quantity-generator hazardous wastes. This report presents the U.S. response to this survey.

The questionnaire covered five different areas: 1) problems, 2) policy approach, 3) technical and organizational aspects, 4) case studies, and 5) treatment and disposal research and development. Comments were also invited.

In the problems area, the U.S. response names the Congressional Acts governing hazardous wastes and the amendments thereto. It also indicates the exemptions, which include household wastes. Although not legally defined as hazardous, these wastes are nevertheless defined by the EPA and individual States.

In the area of policy approach, the national policy regarding household hazardous wastes (HHW) is presented. This policy, which was formally stated by the EPA in November 1988, is to provide technical assistance to State and local governments and to promote the dissemination and use of educational materials. Various State and local policies are also presented.

With regard to small quantity generators (SQGs), policy changes occurred in 1984 when the Hazardous and Solid Waste Act (HSWA) was amended to include SQGs. In April 1986, EPA published an implementation plan describing its strategy concerning regulations that apply to SQGs. This strategy includes both a regulatory and nonregulatory approach, both of which are described.

The State and regional approaches are also described and include both regulatory and nonregulatory programs aimed at SQGs. Efforts at the local/community level are also included in the report.

In the area of supporting institutions, organizations, and authorities, the report provides a breakdown of those involved in household hazardous waste management at the national, State, regional/municipal/local, and private levels. Separate collection of HHW has been subsidized by both national and State governments, and funding sources are discussed.

In the area of case studies, the report presents four studies illustrating the application of regulations and policies. These studies cover auto body shops, batteries, used oil, and paint.

PREFACE

This report presents the U.S. response to a survey conducted by the International Solid Waste and Public Cleansing Association (ISWA). The information presented herein covers various aspects of household and small-quantity-generator hazardous wastes. The Office of Research and Development of the EPA is currently looking into all areas of both of these environmental problems, particularly those dealing with household hazardous wastes. We believe this report contains considerable information that should be shared with the public, industry, and academia, whose combined efforts will be required to solve these pressing problems.

Dr. John Skinner
Acting Deputy Assistant Administrator
Office of Research and Development
Washington, D.C.

In the area of treatment and disposal research and development, existing and planned facilities for recycling, treatment, or disposal of HHW are briefly described. Permanent HHW collection centers and the disposition of solvents received at these centers are also discussed.

The research and development activities that have been undertaken by industry, government agencies, and citizens' groups are presented.

Finally, the future perspectives on HHW and SQGs in the United States are presented.

This report was submitted in fulfillment of Contract 68-02-4279 by Dana Duxbury & Associates, Andover, Massachusetts, under the sponsorship of the U.S. Environmental Protection Agency.

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SECTION 1

INTRODUCTION

This report has been prepared in response to a survey conducted by the International Solid Waste and Public Cleansing Association (ISWA), an international nongovernmental organization comprised of 27 national organizations of waste management professionals. The ISWA Working Group on Hazardous Wastes has been active since 1984. Its first 3-year program resulted in the publication of a book entitled International Perspectives on Hazardous Waste Management in 1987 by Academic Press.

As part of its second 3-year program, running from 1987 to 1990, the Working Group is becoming active in the field of household hazardous waste management and small-quantity hazardous waste generators. As part of this activity, ISWA designed a survey to generate information for an international report on household hazardous waste and small-quantity generators, which will serve as an instrument for mutual exchange of experience and cooperation (see Appendix A).

The U.S. Environmental Protection Agency (EPA) prepared this report to provide the ISWA Working Group with the U.S. response to its survey. Section 2 addresses the subject of Problems; Section 3, Policy Approach; Section 4, Technical and Organizational Aspects; Section 5, Case Studies; and Section 6, Treatment and Disposal Research and Development. Appendix A contains the ISWA Questionnaire, Appendix B presents a table and other information regarding State laws and regulations governing household hazardous waste, and Appendix C lists the Permanent Household Hazardous Waste Collection Programs operating in 1988. A glossary of acronyms is presented at the end of the report.

SECTION 2

PROBLEMS

2.1 HAZARDOUS SUBSTANCES AND CONSUMER PRODUCTS

The EPA promulgated regulations under the Resource Conservation and Recovery Act (RCRA) (40 CFR, Subtitle C) that define which wastes are regulated as hazardous. Hazardous wastes are solid wastes that are listed as hazardous waste in the RCRA regulations or that demonstrate characteristics of a hazardous waste [i.e., ignitability, corrosivity, reactivity, and extraction procedure (EP) toxicity].

Individual States may receive authorization under RCRA to regulate waste generators at least as stringently as Federal law requires. According to a representative of the RCRA Hotline [(800) 424-9346], 42 of the 50 States have been delegated this authority under the original 1976 Act. Therefore, the wastes and the generators that are addressed by a State's policy regarding small-quantity generators (SQGs) or household hazardous waste (HHW) vary from State to State, depending on State definitions of a hazardous waste, an HHW, and an SQG, and on priorities within the State.

Hazardous substances that are subject to regulation under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)* of 1980 include specified reportable quantities listed in the regulations, and those wastes regulated by RCRA. CERCLA and its accompanying amendments (the Superfund Amendments and Reauthorization Act, or SARA) regulate hazardous substances as they pertain to waste site cleanup, emergency response, and providing information to communities (community right-to-know information).

Hazardous substances used in the workplace are also regulated. The Occupational Safety and Health Administration (OSHA) has set permissible exposure limits for approximately 400 substances appearing on the "Z List" of the Occupational Safety and Health Act.

Wastes generated by households (defined as including single and multiple dwellings, hotels, motels, and other residential sources) are excluded from regulation under RCRA Subtitle C. Wastes generated by households are not legally defined as hazardous. The EPA and individual States defined HHW, however, and a discussion of these definitions is provided in Section 3.

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* Commonly referred to as Superfund.

2.2 COMMERCIAL SMALL-QUANTITY GENERATORS

Subtitle C of RCRA excludes from regulation those businesses that do not generate wastes in sufficient quantities to be regulated as large- or small-quantity hazardous waste generators. These conditionally exempt businesses must meet the following criteria:

- Hazardous waste cannot be generated in excess of 100 kg/month.
- No more than 1 kg of waste defined under the regulations as acutely hazardous may be generated each month.
- No more than 100 kg of acutely hazardous residue or contaminated debris may be generated each month.
- No more than 1000 kg of hazardous waste may be accumulated on site at any one time.

Businesses that are exempt from RCRA Subtitle C regulations may be subject to compliance with corresponding State regulations. Individual States are authorized by the U.S. EPA to regulate the generation of hazardous waste more stringently than the Federal Government. For example, the Commonwealth of Massachusetts regulates nonhouseholds that generate more than 20 kg of hazardous waste per month. In California, all hazardous waste (including household hazardous waste) is subject to State regulatory requirements. Furthermore, SQGs are not exempt from CERCLA and SARA, which have been interpreted to impose retroactive, strict, joint-and-several liability for cleanup costs connected with releases of hazardous waste to the environment.

SECTION 3

POLICY APPROACH

3.1 POLICY AIMS FOR HHW

3.1.1 National Policy

Because HHW is not regulated as a hazardous waste under RCRA Subtitle C, EPA's policy is not aimed at regulating, but rather at promoting HHW collection and management programs by providing funding, information, and technical assistance to State and local governments.

The EPA completed a formal study of HHW in response to a congressional directive. In Section 302 of the 1984 Hazardous and Solid Waste Amendments (HWSA) to RCRA, Congress directed the EPA to explore the relationship between household products and HHW and the formation of landfill leachate. In an effort to explore these concerns and to provide further knowledge about HHW collection programs, EPA completed an initial study entitled "A Survey of Household Hazardous Waste Collection Programs" in October 1986.

In November 1988, EPA issued a formal policy statement regarding HHW collection and management programs. According to this statement, the EPA "... enthusiastically supports household hazardous waste (HHW) collection and management programs.... EPA believes that these programs are important because they: (1) promote citizen awareness regarding proper handling of HHW; (2) reduce the amount of HHW in the municipal solid waste stream which ultimately is taken to municipal waste combustors or landfills; (3) limit the amount of HHW which is dumped down a drain and ultimately discharged to a publicly-owned treatment works (POTW), or is dumped indiscriminately; (4) remove a greater amount of HHW from the home, thereby reducing potential safety hazards; and (5) help to reduce the risk of injuries to sanitation workers." (Porter memorandum, 11/88)

At the EPA Second National Conference on HHW Management (HHWM), Joseph Carra, who was Director of the EPA's Waste Management Division of the Office of Solid Waste at the time of the conference, stated the EPA's policy goal of regarding how the Agency will address HHW management. According to Carra, EPA's role is to provide technical assistance to State and local governments and to promote the dissemination and use of educational materials.

3.1.2 State/Regional Policy

Although most of the 50 States do not regulate HHW, States such as California and Rhode Island have chosen to apply hazardous waste regulations

to HHW. State policies and management plans vary from State to State. Since 1981, more than 1300 HHW collections have occurred in 43 states with varying levels of State support and guidance (see Table 1 and Figure 1). The diversity and number of State programs that address HHW are highlighted in Appendix B.

3.1.3 Local/Community Policy

Community management plans for HHW vary significantly, ranging from no action to activities such as public education only, one-time collection days, periodic (e.g., seasonal) collections, collections involving single waste streams such as paint only or pesticides only, exchanges such as paint exchange days, joint community-sponsored collection days, permanent collection facilities that operate somewhere between 1 day per month and 5 days per week, and curbside collection of HHW such as used oil.

The following are examples of different community approaches:

- Tuscaloosa and Birmingham, Alabama, jointly sponsor a program called "Project ROSE" (Recycled Oil Saves Energy). The program which has operated successfully since 1977, includes a voluntary, curbside, used-oil-collection program.

- San Bernardino, California, operates an ongoing paint and oil collection site that is open 5 days per week. Latex paint that is collected is bulked, reprocessed, and sold. Oil-based paint is bulked, tested for PCB's, and reused if it is not hazardous; if it is hazardous, it is disposed of at a licensed hazardous waste facility.

3.2 POLICY AIMS FOR SQGS

3.2.1 National Policy

Prior to the 1984 HSWA, SQG waste was not regulated as hazardous waste. Since 1984, EPA's policy aim with regard to SQGs has been to address hazardous waste management through both a regulatory and nonregulatory approach. Currently, SQGs must comply with national hazardous waste management requirements. Like HHW generators, SQGS are also addressed by CERCLA and SARA, which pose retroactive, strict, joint-and-several liability on the generators of hazardous waste.

The EPA published an implementation plan describing its strategy with regard to regulations that apply to SQGs (U.S. EPA April 1986). This strategy relies primarily on information dissemination, voluntary compliance, spot compliance monitoring, and enforcement action for major violators as the means for implementing the standards. The goal of the EPA plan is "...to ensure that SQGs are brought into the 'regulated community'" (University of California at Davis 1987, p. 52 -53).

The nonregulatory approach EPA has chosen is meant to encourage SQGs to apply the Agency's waste management hierarchy--reduce, reuse, recycle, treat,

TABLE 1. HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAMS TOTALED BY YEAR[a]

State	1981	1982	1983	1984	1985	1986	1987	1988	Total
Alabama					1				1
Alaska			2	3	4	7	2	6	24
Arizona							1	1	2
Arkansas							1		1
California		1	5	12	37	28	80	95	258
Colorado				4	1				5
Connecticut				1	9	25	24	38	97
Delaware							1		1
Florida				21	22	16	13	17	89
Georgia									0
Hawaii						1	1	2	4
Idaho									0
Illinois							1	6	7
Indiana					2	1	2	5	10
Iowa							2	3	5
Kansas						3			3
Kentucky	2		1						3
Louisiana					1	1	1	2	5
Maine				1		1			2
Maryland					1		1	3	5
Massachusetts		1	14	31	33	78	51	101	309
Michigan				2	8	14	10	20	54
Minnesota					6	10	9	28	53
Mississippi									0
Missouri								1	1
Montana				1					1
Nebraska					3		1	3	7
Nevada									0
New Hampshire				1	4	11	20	17	53
New Jersey					8	7	3	11	29
New Mexico					1				1
New York		1	4	2	8	21	28	44	108
North Carolina					2				2
North Dakota									0
Ohio				2		1		1	4
Oklahoma									0
Oregon		1	1	1		2	2	3	10
Pennsylvania					1	1	2	5	9
Rhode Island				5	4	4	7	5	25
South Carolina								1	1
South Dakota						1			1
Tennessee						1			1
Texas						6	2	5	13
Utah						2			2

(continued)

TABLE 1 (continued)

State	1981	1982	1983	1984	1985	1986	1987	1988	Total
Vermont									0
Virginia				1	2	5	3	2	13
Washington					1	3	7	14	25
West Virginia		3	4	3	8	12	12	12	54
Wisconsin					1		1		2
Wyoming				2	6	9	9	7	33
Total by year	2	7	31	93	174	271	297	458	1333
Total States	1	5	7	17	25	27	29	29	43

[a] Source: Dana Duxbury & Associates, January 1989.

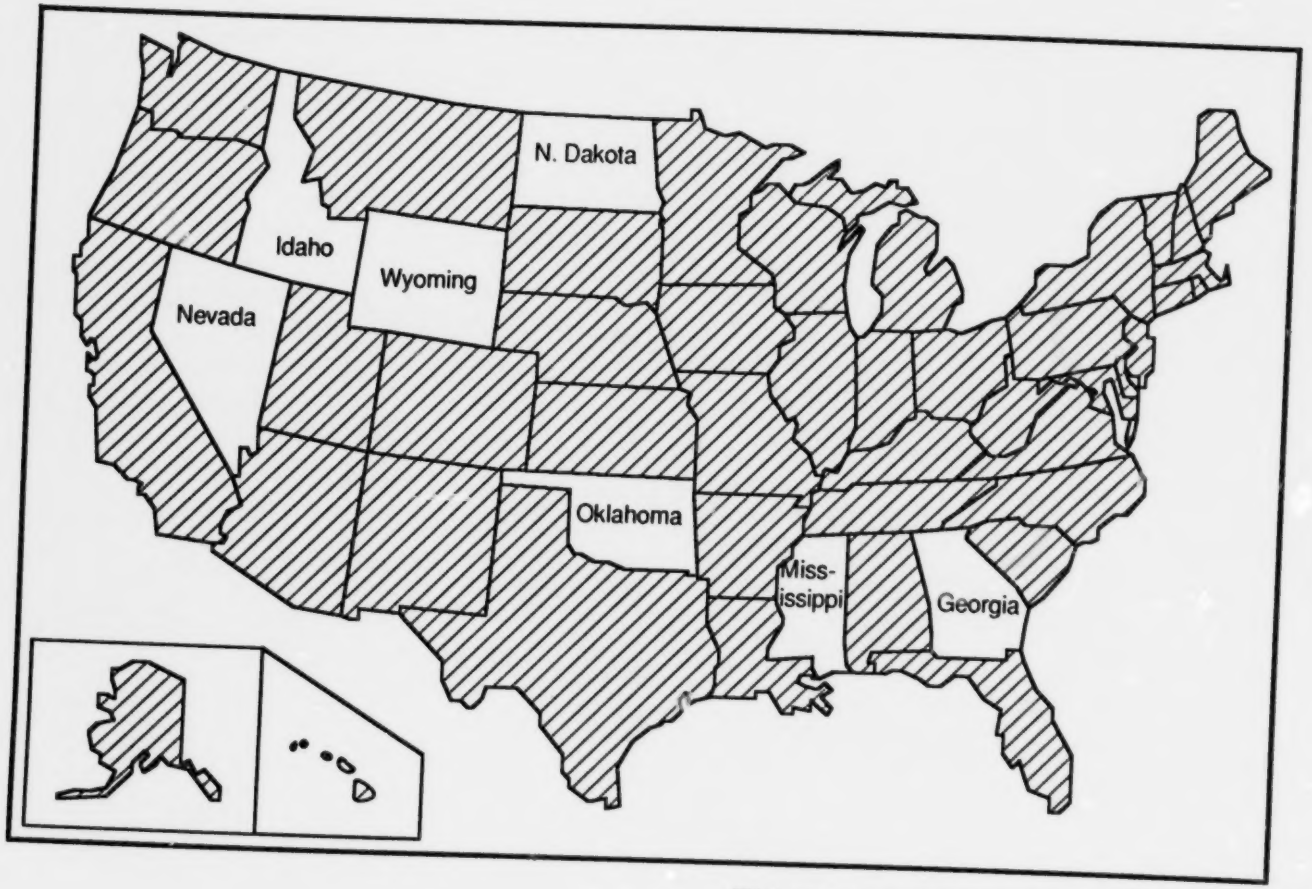


Figure 1. States with HHW collection programs.

and dispose of--to the management of hazardous waste. The EPA, which has been focusing on the waste reduction step, is currently in the process of developing a Pollution Prevention Policy Statement that would apply to hazardous waste generators, including SQGs. The newly established Pollution Prevention Office addresses the prevention of pollution through programs that include grants for State waste minimization efforts.

3.2.2 State/Regional Policy

The policy of individual States is to provide both regulatory and nonregulatory programs directed at SQGs. The States' regulatory policy is to implement the requirements of RCRA. Most States have been delegated authority to implement their own regulations in place of the Federal hazardous waste regulations. The States must regulate SQGs at least as stringently as RCRA, and many States regulate SQGs more stringently than Federal law requires. Several States also have their own Superfund programs, which can hold SQGs responsible for the cleanup of hazardous waste sites and spills.

Florida has provided the opportunity for its regulated SQGs to participate with HHW generators in its Amnesty Days Program. The Amnesty Days Program allowed for one drum of free disposal and four drums at a rate 25 percent lower than the commercial rate for SQGs. By April 1987, 15 percent of the 10,600 Amnesty Day Program participants were SQGs (University of California at Davis 1987, p. 66). According to Florida's HHW Program Manager, the Florida program may discontinue allowing SQGs to bring their hazardous waste to collection sites because State law now prohibits SQGs from transporting their own waste.

A nonregulatory hazardous waste policy of the States is to promote the reduction of hazardous waste, including that generated by SQGs. In 1985, the National Roundtable of State Waste Reduction Programs was organized to promote the development of State programs and to exchange technical and general information on waste reduction. The Roundtable, which meets biannually, is composed of governmental, university, and public interest groups representing 42 States.

According to a University of California at Davis study (1987), most of the SQG education programs run by the States surveyed are funded by EPA grants. Most of the States surveyed stressed the importance of separating the information and assistance programs for SQGs from the State's enforcement program. Many staff people believe that SQGs worried about enforcement actions following inquiries for assistance would not seek help (University of California at Davis 1987).

3.2.3 Local Community and Policy

Local governments and community organizations have undertaken efforts to promote regulatory compliance and improved waste management. For example, by July 1989, a nonprofit group in California, the Local Government Commission, Inc., will have assisted more than 30 communities by providing hazardous waste management and reduction assistance to generators (often including

SQGs). To date, however, no coordinated official policy, legislative framework, or management plan has been applied at the local level to address SQGs. The U.S. Conference of Mayors has been involved in environmental issues, but it has not yet focused attention on SQGs.

3.3 GENERATORS OF HHW

3.3.1 National Policy

By definition, waste generated by households is unconditionally exempt from Federal hazardous waste management regulations promulgated under RCRA Subtitle C. This exemption also applies to HHW collected in large quantities, such as during an HHW collection program. When HHW is mixed with any quantity of regulated hazardous waste, however, the resulting mixture is subject to regulation under RCRA. Although HHW is exempt from the hazardous waste management regulations of RCRA Subtitle C, the EPA recommends that sponsors of HHW collection programs manage the collected HHW as hazardous waste.

The EPA has developed a list of broad categories of household wastes that would be regulated as hazardous if they were generated in larger quantities. These categories are based on the RCRA definition of hazardous waste as those solid wastes that are listed as hazardous waste in the regulations or demonstrate characteristics of a hazardous waste (i.e., ignitability, corrosivity, reactivity, and extraction procedure toxicity).

The categories of common hazardous household products included in EPA's list are as follows:

- Household cleaners
- Automotive products
- Home maintenance and improvement products
- Lawn and garden products
- Miscellaneous products, such as photo processing chemicals, batteries, pool chemicals, and personal care products

As indicated earlier, although HHW is exempt from RCRA Subtitle C requirements, HHW generators (municipalities) are not relieved of liability under CERCLA and SARA. As defined by SARA, retroactive, strict, joint-and-several liability can be imposed on the generators of hazardous waste. Therefore, if hazardous waste is released to the environment from a municipal solid waste landfill, municipalities that sent HHW to the landfill could be held liable for part or all of the cleanup costs. This potential liability exists whether or not any negligence was involved and whether or not applicable regulations governing hazardous waste management were less stringent at the time of disposal than they are currently.

3.3.2 State/Regional Policy

States that apply hazardous waste regulations or formal guidelines to HWW management have promulgated strict definitions of HHW. The following are examples:

- In Iowa the definition in Chapter 455F of the Iowa Code reads as follows: "Household hazardous material means any product used for residential purposes and designated by rule of the Department of Natural Resources and may include hazardous substances, as defined, and hazardous waste, as defined, and shall include but is not limited to motor oil, motor oil filters, gasoline and diesel additives, degreasers, waxes, polishes, solvents, paints, with the exception of latex-based lacquers, thinners, caustic household cleaners, spot or stain removers with petroleum base or petroleum based fertilizers." The Iowa definition excludes laundry detergents or soaps, dishwashing compounds, chlorine bleach, personal care products and soaps, cosmetics, and medications.

- According to the Washington State definition, household hazardous substance means any liquid, solid, contained gas, or sludge (including any material, substance or product, commodity or waste, used or generated in the household, regardless of quantity) that exhibits any of the characteristics or criteria of dangerous waste as set forth in Chapter 173-303 of the Washington Annotated Code. Such substances become moderate risk waste when discarded (Planning Guidelines for Local Hazardous Waste Plans, RCW 70.105).

3.3.3 Local/Community Policy

Several organizations have attempted to define HHW by listing items considered hazardous. At EPA's Second National Conference on HHWM (held in San Diego, California, November 2-4, 1987), Allen Maples of the EPA noted that efforts are most commonly undertaken at the local level when community groups and organizations decide they want to organize a collection program. Maples said that these lists vary widely. The major categories assembled are often, but not always, similar to EPA or State definitions.

3.4 WASTE AND WASTE GENERATORS

3.4.1 National Policy

As previously noted, the EPA promulgated regulations under RCRA that define regulated hazardous wastes as solid wastes that are listed as hazardous in the regulations or that demonstrate characteristics of a hazardous waste.

It was also previously noted that hazardous substances subject to regulation under CERCLA include those substances of specified reportable quantities that are listed in the regulations and those wastes that are regulated by RCRA. The Acts that regulate hazardous substances as they pertain to waste site cleanup, emergency response, and the provision of information to communities (community right-to-know information) are CERCLA and SARA.

Small-quantity hazardous waste generators (SQGs) are regulated differently from large-quantity generators (LQGs) and conditionally exempt

generators. The SQGs are defined according to the amount and type of hazardous waste they generate (see Figure 2).

As defined by RCRA, a hazardous waste generator is a SQG if it meets the following requirements:

- It generates more than 100 kg/month and less than 1000 kg/month.
- It generates no more than 1 kg/month of acutely hazardous waste.
- The generator ships hazardous waste offsite within 180 days after more than 1000 kg has accumulated.
- It accumulates no more than 6000 kg of hazardous waste at any one time.

3.4.2 State/Regional Policy

Individual States may receive authorization under RCRA to regulate waste generators more stringently than the Federal law requires. Therefore, the wastes and the generators that are addressed by a State's SQG policy may vary from State to State, depending on State definitions of a hazardous waste and of an SQG and on priorities set by the State.

For example, waste oil is defined as a hazardous waste in eight States and as a special waste in six States. Although a special waste is not regulated as stringently as hazardous waste, it may be subjected to requirements such as permitting, burying restrictions, and disposal restrictions (e.g., a landfill ban in the State of Minnesota). The SQG programs initiated at the State level address a wide variety of wastes and generators based on the concerns of residents, policymakers, and program administrators in a given region.

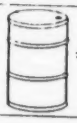
3.4.3 Local/Community Policy

Cities and towns have directed their attention to a wide range of wastes and generators. Because of the absence of official policy, legislative framework, or management plans at the local level, the SQG wastes and generators that receive attention vary according to local concerns and priorities.

3.5 INFORMATION ACTIVITIES (HHW)

3.5.1 National Activities

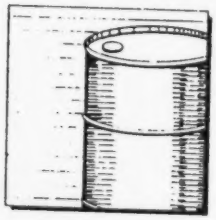
Information activities are sponsored by the EPA. In November 1988, EPA provided funding and support for its Third Annual National Conference on Household Hazardous Waste Management, which was held in Boston. At this conference, approximately 70 experts from the United States, Canada, and Europe delivered presentations addressing topics concerning the definition, regulation, liability, collection, management, and disposal of HHW. Several conference speakers and moderators were provided by the EPA.

KEY:  = *1 barrel = about 200 kilograms of hazardous waste which is about 55 gallons*

Generators of No More Than 100 kg/mo

If you generate no more than 100 kilograms (about 220 pounds or 25 gallons) of hazardous waste and no more than 1 kg (about 2 pounds) of acutely hazardous waste in any calendar month, you are a conditionally-exempt small quantity generator and the federal hazardous waste laws require you to:

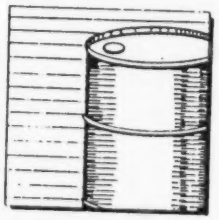
- Identify all hazardous waste you generate.
- Send this waste to a hazardous waste facility, or a landfill or other facility approved by the state for industrial or municipal wastes.
- Never accumulate more than 1000 kg of hazardous waste on your property. (If you do, you become subject to all the requirements applicable to 100-1000 kg/mo generators explained in this handbook.)

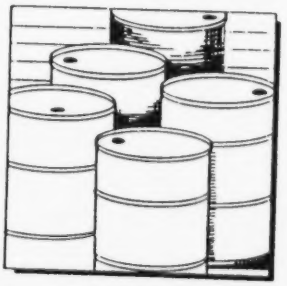


100-1000 kg/mo Generators

If you generate more than 100 and less than 1000 kg (between 220 and 2,200 pounds or about 25 to under 300 gallons) of hazardous waste and no more than 1 kg of acutely hazardous waste in any month, you are a 100-1000 kg/mo generator and the federal hazardous waste laws require you to:

- Comply with the 1986 rules for managing hazardous waste, including the accumulation, treatment, storage, and disposal requirements described in this handbook.





Generators of 1000 kg/mo or More

If you generate 1000 kg (about 2,200 pounds or 300 gallons) or more of hazardous waste, or more than 1 kg of acutely hazardous waste in any month, you are a generator of 1000 kg/mo or more and the federal hazardous waste laws require you to:

- Comply with *all* applicable hazardous waste management rules.

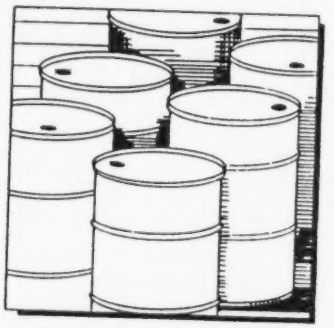


Figure 2. Categories of hazardous waste generators.

The EPA is considering producing a newsletter targeted to help communities seeking information about HHW collection and management. The newsletter, which will be published quarterly beginning in 1989, is expected to be mailed to approximately 4000 people.

Individuals concerned about HHW can also contact the RCRA Hotline to obtain a 26-page bibliography of HHW literature or to obtain answers to specific questions.

One informational activity required by the Federal Government is product labeling. Federal law requires some consumer products to be labeled. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requires informative and accurate labeling of pesticide products. A provision addressing home pesticides requires labels that contain disposal information recommending that consumers wrap waste pesticides in newspaper and put them in the rubbish.

The EPA provides information indirectly by providing grants to individual States. States may receive Federal grants that can be applied toward the implementation of State HHW programs.

A nongovernmental organization, The Household Products Disposal Council, was set up by the Chemical Specialties Manufacturers Association (CSMA), a national industry association. The Council set up an information and referral service for community organizers, groups, and waste managers to provide information to concerned consumers. Guidelines have been offered to communities that briefly explain how to design a community disposal program. A manual containing these guidelines was sent to community leaders and organizers and to State officials. A pamphlet was also prepared for distribution by communities and by a Corporate Distribution Program. This pamphlet offers "dos and don'ts" for disposing of household consumer products.

3.5.2 State/Regional Activities

State information activities include providing a "hotline"/referral service, providing speakers for workshops and conferences, distributing informational materials, promulgating shelf-labeling requirements for retail stores, and responding to phone inquiries.

Several States have made "hotlines" available to receive HHW questions. Florida, California, Minnesota, and Washington have provided statewide, toll-free hotlines for receiving questions related to HHW and other hazardous wastes.

The Minnesota Pollution Control Agency (MPCA) provides such a hotline service. The MPCA referral/advice line instructs callers on how to manage or dispose of hazardous household products. Most callers (78.3 percent) are told how their products (e.g., solvents, paints, and gasoline) can be reused or recycled. Only 17.5 percent of the callers are instructed to hold materials (such as pesticides) for an HHW collection day.

Iowa initiated a mandatory shelf-labeling program for hazardous household products sold in retail stores. Regulated retailers must affix a shelf label sticker adjacent to the price information, designating the items that are defined as hazardous household products by the State of Iowa. Informational posters also must be displayed close to the shelves where products are for sale. The posters explain the significance of the shelf label and the relationship of improper disposal of household hazardous materials to ground-water contamination, and they direct consumers to additional informational brochures available at the establishment. The brochures provide more detail about the hazards, disposal options, and some alternative uses.

3.5.3. Local/Community Activities

Many cities, towns, and local institutions have sponsored educational activities concerning HHW. Efforts include developing curricula for schools, advertising HHW collection programs, and offering telephone assistance "hotlines."

The League of Women Voters in San Bernardino County, California, developed a technical packet for teachers and a 10-minute video appropriate for 3rd through 6th graders. The video highlights dangers of using household chemicals and the benefits of properly disposing of hazardous household products. The educational efforts are designed for students as well as their parents. At EPA's Third National Conference on HHWM (held in Boston, November 2-4, 1988), Joan Dotson of the League of Women Voters stated that it is hoped that students will share the information from the video with their parents, and will encourage them to use and dispose of hazardous household products safely.

The Southwest Missouri State University HHW Project sponsors an educational program that is designed to supplement State efforts. The intent of this program is to help people identify risks, make informed decisions, and use, store, and dispose of products safely. The program also promotes waste exchange and recycling, and a local Telephone Information Request line is operated to answer citizens' questions and concerns.

3.6 INFORMATION ACTIVITIES (SQGS)

3.6.1 National Informational Activtities for SQGs

The U.S. Environmental Protection Agency sponsored a nonregulatory program to assist small-quantity generators with technical and regulatory questions. The program, the Governmental Refuse Collection and Disposal Association (GRCDA) Small Quantity Hazardous Waste Generator Information and Assistance Clearinghouse, handled approximately 400 assistance cases between April 1, 1988, and December 1, 1988 (the Clearinghouse in Silver Spring, Maryland, can be contacted by calling 800-458-5886.)

The services offered by the Clearinghouse include:

- Technical help regarding waste identification, minimization, inventory, treatment, and disposal.
- Guidance regarding compliance with State and Federal regulations.
- Information about local service companies, public assistance programs, current literature, and waste exchanges.

The Clearinghouse also published a free quarterly newsletter as an information exchange vehicle for regulatory and nonregulatory Federal, State, and local agencies; technical assistance programs; trade associations; research facilities; and waste exchanges in reference to SQG hazardous waste minimization issues. Chris Voell of the Government Refuse Collection and Disposal Association (GRCDA) reported that the Clearinghouse recently lost its EPA funding, but it is continuing to provide limited services and may seek new funding in the future.

The EPA also awarded grants under the authority of RCRA Section 8001 (called "8001 grants"), which States could use by design and administer SQG and other waste reduction programs. In fiscal year 1986, 51 grants were awarded for SQG education/outreach programs. The funds awarded totaled $3,241,957, and the grants awarded ranged from $3900 to $259,980. This program has since been discontinued.

The EPA's new Pollution Prevention Office is currently funding States with RCRA Integrated Training and Technical Assistance (RITTA) grants for programs that promote hazardous waste minimization. Most of the programs focus on SQGs. Fourteen States were awarded grants totaling $3.6 million (approximately $320,000 per State). Four states received a grant for a jointly sponsored program. The grants are intended for use over a 3-year period. In addition, the Pollution Prevention Office has also accepted applications for an additional $3 million of grant money for State training and waste minimization programs and will be accepting applications for another $4 million.

The EPA runs two phone lines, the Small Business Ombudsman and the RCRA Hotline, which SQGs can use to obtain information and assistance regarding hazardous waste management.

An EPA assistance program that is now in the planning stages, but may begin providing some services by the end of 1989, will be provided in the form of a waste minimization information clearinghouse. An EPA economist with the Waste Minimization Branch reported that the program will emphasize assistance for small- and medium-sized hazardous waste generators, and it is expected to provide services that include an electronic bulletin board, a telephone hotline, information about national and State hazardous waste activities, case studies, bibliographies, and other publications.

3.6.2 State/Regional Informational Activities for SQGs

States have provided a variety of information and assistance programs that are available to SQGs. The National Roundtable of State Waste Reduction

Programs, organized in 1985, promotes waste reduction programs, including programs that target SQGs. Between 1985 and June 1988, Roundtable members have helped establish and expand waste reduction programs in 35 States. Programs include compliance assistance, general information, clearinghouses, general and onsite technical assistance, matching grants, research grants, loans, tax incentives, workshops/training, public education, and waste exchanges. The proposed fiscal year 1989 budget for these types of programs is $281,320.

The GRCDA notes at least 19 State agencies that sponsor programs geared specifically for SQGs. Arkansas and Massachusetts are two examples:

- The Arkansas Department of Pollution Control and Ecology's Hazardous Waste Division has instituted an educational program that provides assistance to SQGs. This program offers a variety of technical assistance services, including workshops.

- The Massachusetts Department of Environmental Management provides both educational and technical assistance programs for SQGs. Educational efforts have included workshops that provided information to schools, hospitals, and commercial laboratories regarding hazardous waste regulatory compliance and waste reduction. Technical assistance efforts have targeted electroplaters and auto body shops for assistance in reducing and safely managing hazardous waste.

3.6.3 Local/Community Informational Activities for SQGs

Local institutions and organizations, such as municipal governments, universities, and research organizations, provide nonregulatory assistance to SQGs. The GRCDA reports that at least 41 programs have been sponsored. Examples include programs sponsored by the Solid Waste Services Department of Anchorage in Alaska, the Erie County Environmental Compliance Services in New York State, the Pennsylvania Environmental Research Foundation Center for Hazardous Materials Research, and the Clemson University Environmental Systems Engineering Program in South Carolina.

3.7 HHW POLICY BASIS--COMPULSORY OR VOLUNTARY?

3.7.1 National HHW Policy Bases

Voluntary--

The national policy for addressing HHW management is essentially based on voluntary activities because, as was previously noted, HHW is not federally regulated under RCRA Subtitle C. Also as noted earlier, municipalities are subject to HHW liability under CERCLA and SARA. In 1987, roughly 165 municipal solid waste landfills were included in the 850 National Priorities List (NPL) of sites requiring cleanup under Superfund. The municipalities that send waste, including HHW, to these landfills are potentially liable for the cleanup costs. Because of this potential liability, municipalities have an incentive for voluntarily undertaking HHW reduction, reuse, and management

activities in an effort to eliminate the potential long-term liability of landfill cleanup under CERCLA.

Compulsory--

A previously noted regulatory provision addressing HHW is the labeling requirement of FIFRA. This Act requires informative and accurate labeling of pesticide products. A provision addressing home pesticides requires the label to contain disposal information recommending that consumers wrap waste pesticides in newspaper and put them in the rubbish.

3.7.2 State/HHW Policy Bases

Voluntary--

Numerous States rely heavily on voluntary activities to address HHW management. Collection programs are frequently sponsored at the county and local level without State involvement. Local program sponsors include public works departments, conservation commissions, health boards, Leagues of Women Voters, and industry, to name a few.

Some States support these efforts by providing funding, information, and technical assistance. For example, Connecticut, New Hampshire, Wisconsin, and Massachusetts provide matching grants to encourage HHW collection programs. (See the section on State/regional information activities for more detail on State support for voluntary programs.)

Compulsory--

As was noted earlier, most States do not regulate HHW as hazardous; therefore, they rely heavily on voluntary activities. Compulsory programs include State-required labeling, planning, mandatory collection, and regulations pertaining to the operation of permanent and temporary collections. Appendix B contains a table prepared by Dana Duxbury & Associates, which highlights State programs, including compulsory programs. Examples of such programs are presented here:

- Iowa requires permits and mandatory shelf labeling by retailers that sell hazardous household products. The permits require retailers to affix a shelf-label sticker adjacent to the price information, designating that the items are hazardous household products. Informational posters are displayed close to the shelves where products are for sale, and brochures are made available to provide more detail about hazards, disposal options, and some product alternatives.

- Connecticut law requires the establishment of an HHW program that includes guidelines, mandates a report to the legislature, and requires communities to use licensed hazardous waste contractors. Contractors must assume the legal status of the hazardous waste generator. Connecticut's guidelines (for which regulations will be promulgated) outline the procedures for holding collections and for obtaining State matching grants of up to 50 percent of the cost. The State must approve all final plans.

- The Florida Amnesty Days Program required the State to offer an HHW collection day in each county. According to the State HHW Program Manager, it is hoped that counties will get into the habit of running HHW collections and support a network of locally operated and funded ongoing programs.

- California's Tanner Act (A.B. 2948) requires county level planning as part of a mandatory statewide planning effort. One of the eight elements mandated for the comprehensive plans is consideration of the needs of small businesses and households. The State is also required to assist local governments and to provide public information. The California Waste Management Board is charged with the responsibility of developing model operation plans for community collection programs, and proper procedures for handling, storage, transport, and training. The Board is also charged with establishing guidelines on the types of household substances to be disposed of as HHW.

- The Minnesota Pollution Control Agency (MPCA) is required by State law to manage HHW by establishing collection sites and providing information, education, and technical assistance. The central office of MPCA is also required to manage a hotline and administer grants for 10 to 20 collections.

- Under Washington State law, local governments are responsible for preparing plans for the management of HHW generated within their local boundaries. Local governments must manage HHW as hazardous materials.

- In New Hampshire, some guidelines and minimum requirements are issued for those sponsors that are awarded grants for HHW collection programs. These include conducting significant public education campaigns.

3.7.3 Local/Community HHW Policy Bases

Voluntary--

Much of the local activity in the area of HHW results from voluntary programs. Counties, cities and towns, industry (including waste management companies), and environmental advocacy groups support or sponsor programs that educate consumers about HHW, provide consumers with HHW collection days, and provide or promote dissemination of information regarding substitution of substances. The following are a few examples:

- County Program. San Bernardino County, California, sited six ongoing (operating at least once per month) hazardous waste collection facilities. The county also cosponsored a program with the League of Women Voters, through which a school curriculum was developed to teach 3rd through 6th graders about HHW.

- City/Town Program. The city of Somerville, Massachusetts, sponsored a HHW collection day in September 1988. Funds for the program were raised from local businesses. Public education associated with the program included developing a booklet on solid waste and HHW, which was distributed to every resident; placing an exhibit in a local library, hospital, and mall; and arranging for a speaker to discuss HHW with students in local elementary schools.

- Industry Collection Programs. U.S. companies that have sponsored HHW collection programs include Dow Chemical, Monsanto, Sperry Rand, Browning-Ferris Industries, Chem-Waste Management, Chem Processors, GSX, and Hercules. Dow Chemical has sponsored programs in communities where Dow has a large manufacturing presence, including locations in Michigan, Louisiana, and Texas.

- Industry Substitution and Reformulation Efforts. U.S. companies have undertaken product reformulation efforts. For example, the Polaroid Corporation has worked to phase out mercury from its batteries, and the paint industry has reduced the use of mercury as a preservative in latex paint.

- Environmental Advocacy Group. Clean Water Action Project, a national environmental group, prepared a pamphlet about HHW and distributed copies to its members. The pamphlet highlights substitutes to common hazardous household products

Compulsory--

No local programs could be identified that require HHW management activities.

3.8 SQG POLICY BASIS--COMPULSORY OR VOLUNTARY?

3.8.1 National SQG Policy Bases

Voluntary--

The EPA relies in part on voluntary compliance because of its limited resources for enforcing SQG compliance with national hazardous waste regulations and policies through inspections (University of California, 1987, p. 52). Rising hazardous waste disposal costs and the liability associated with improper hazardous waste management serve as incentives to SQGs for voluntarily reducing, reusing, and properly managing hazardous waste. The EPA information clearinghouses, hotlines, and State grants also help to promote voluntary compliance efforts.

Compulsory--

The University of California at Davis (1987) reports that some components of EPA's strategy regarding SQGs focus on compliance and enforcement activities. The EPA intends to apply the same compliance monitoring methods for SQGs as those used for large-quantity generators. Under RCRA, EPA has the authority to inspect, fine, and close down institutions that violate the

Federal hazardous waste regulations, and the Agency can hold generators liable under CERCLA for damage to the environment or public health resulting from hazardous waste disposal and releases to the environment.

3.8.2 State/Regional SQG Policy Bases

Voluntary--

Like the Federal government, States recognize the limited resources available to ensure compulsory compliance with hazardous waste requirements that apply to SQGs. Therefore, States have responded with voluntary outreach, education, and assistance programs.

Compulsory--

States that have been delegated authority to administer their own RCRA programs instead of the Federal program, conduct inspections, levy fines, and can close down institutions that fail to comply with hazardous waste management requirements. State agencies often target an SQG industry with an enforcement effort combined with an education/assistance program.

For example, the Massachussets Department of Environmental Quality Engineering (DEWE), the State's environmental regulatory agency, increased the number of inspections of auto body shops and laboratories while the Department of Environmental Management (DEM), the State's environmental planning agency, was providing voluntary education and assistance programs. These programs were coordinated to make the regulated community aware of a problem and then to promote the voluntary involvement of the targeted group in a program designed to address the problem.

Many States also have their own Superfund programs that permit them to hold hazardous waste generators, including SQGs, liable for the cleanup of hazardous waste sites and spills.

3.8.3 Local/Community SQG Policy Bases

Voluntary--

Counties, cities, and towns sponsor many voluntary programs that promote best management practices and voluntary compliance with hazardous waste management requirements.

Compulsory--

In cases for which they have legal standing, localities can take action to enforce Federal and State laws, and when they have local jurisdiction, they can enforce the laws that apply to SQGs.

3.9 HWW POLICY--ACTIVE, "FRONT-END", OR PASSIVE "END-OF-THE-PIPE MEASURES"?

3.9.1 National Policy

The formal policy of the national government with regard to hazardous waste is based on promoting front-end measures, as indicated by the following declaration in the 1984 HSWA: "The Congress declares it to be the national

policy of the United States that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment." The EPA recommends that hazardous waste generators follow a waste management hierarchy of waste reduction, reuse, recycling, treatment, and disposal. Emphasis is on the waste reduction step of the hierarchy. The EPA recently demonstrated this commitment by establishing its Pollution Prevention Office.

The national government's front-end, hazardous-waste-prevention approach is carried over into the area of HHW. Howard Levenson of the U.S. Congress Office of Technology Assessment (OTA) stated at the Third National Conference on HHWM that whereas HHW collections are important for addressing waste management needs in the short run, hazardous-waste prevention is the key to addressing concerns in the long run. He said that OTA will study volume and toxicity reduction as means of addressing HHW issues.

The EPA also supports front-end HHW management efforts. Bruce Weddle, Director of EPA's Municipal Solid Waste Program for the Office of Solid Waste, stated at EPA's Third National Conference on HHWM that EPA will continue to address HHW issues through activities that include promoting voluntary efforts by industry to "design for disposal." At the same conference, Sylvia Lowrance, Director of EPA's Office of Solid Waste, stated that source reduction can be achieved by educating the public, providing citizens with information, and assisting in technology transfer.

The EPA has demonstrated its support for front-end solutions by programs such as the 8001 Grants Program and the RITTA Grants Program, which have provided funds for State hazardous waste minimization programs. The EPA also sponsors an annual national HHWM Conference that addresses HHW from both front-end and end-of-pipe perspectives. This conferences has placed increasing emphasis on front-end approaches. The Third National HHWM Conference, held in Massachusetts in 1988, placed a great deal of emphasis on front-end approaches, including topics such as comprehensive planning, product reformulation, and waste prevention.

National policymakers also recognize the importance of end-of-pipe measures for safe, environmentally sound collection and disposal of HHW that has accumulated in homes. Both EPA and OTA support HHW collection programs. Howard Levenson of OTA remarked at EPA's Third National HHWM Conference that HHW collections are important for addressing short-run waste management needs, and that reducing the amount of HHW in the municipal waste stream reduces potential liability for municipalities. According to Joseph Carra, former Director of EPA's Waste Management Division of the Office of Solids Waste in 1987, the EPA enthusiastically endorses HHW collection programs and sees its role as providing technical assistance to State and local governments. The EPA has assigned a staff person the responsibility of overseeing EPA activities on HHW, and it sponsors an annual national conference that provides information and support to HHW collection organizers.

3.9.2 State/Regional Policy

In the early 1980s, when the first HHW collection days were held, States focused attention on removing and disposing of HHW that had been accumulating for years in consumers' homes. Because of the growing national and State attention given to pollution prevention and the success of collection programs in the removal of hazardous products from homes, the focus is shifting somewhat from HHW collection to source reduction and recycling. Massachusetts' pending source-reduction legislation, California's Tanner Act requiring comprehensive hazardous materials planning, Iowa's mandatory shelf-labeling law, and Minnesota's telephone hotline encouraging product reuse are examples of how States are placing emphasis on front-end approaches to managing hazardous waste, including HHW issues.

In addition to the front-end measures, States continue to support end-of-pipe measures designed to ensure safe, environmentally sound disposal of HHW. One reason some States are supporting HHW collection is to help residents recognize that consumers share responsibility with industry for ensuring the proper disposal of hazardous waste. It is hoped that this recognition will promote public cooperation in the accceptance of the siting of a hazardous waste treatment, storage, and disposal facility in their communities. This partially explains why States have helped fund many of the more than 1300 HHW collections held in the United States since 1981.

3.9.3 Local/Community Policy

Local activities have included both front-end and end-of-pipe strategies for addressing HHW. Front-end activities include public education efforts to inform people about product substitutes and to encourage reduction in the use of toxic substances and lobbying efforts for labeling and source-reduction legislation.

Communities also continue to sponsor end-of-pipe collection programs. As shown in Figure 3, the number of collections have increased steadily since 1981. The number of permanently operating collection programs (i.e., open at least once per month) has also grown. Dana Duxbury & Associates identified 27 permanent HHW collection programs operating or expected to operate in seven states by early 1989. This is nearly double the number in 1987 (see Appendix C, Tables C-1 and C-2).

Collections of HHW are highly visible, politically popular events considered important for protection of the health and safety of residents and sanitation workers, for protection of the environment, for minimization of liability due to the disposal of hazardous wastes in municipal landfills, and for minimization of damage to publicly owned treatment works (POTWs). For this reason, even though many communities have looked at front-end strategies for addressing HHW management, end-of-pipe collection events have continued to grow in number.

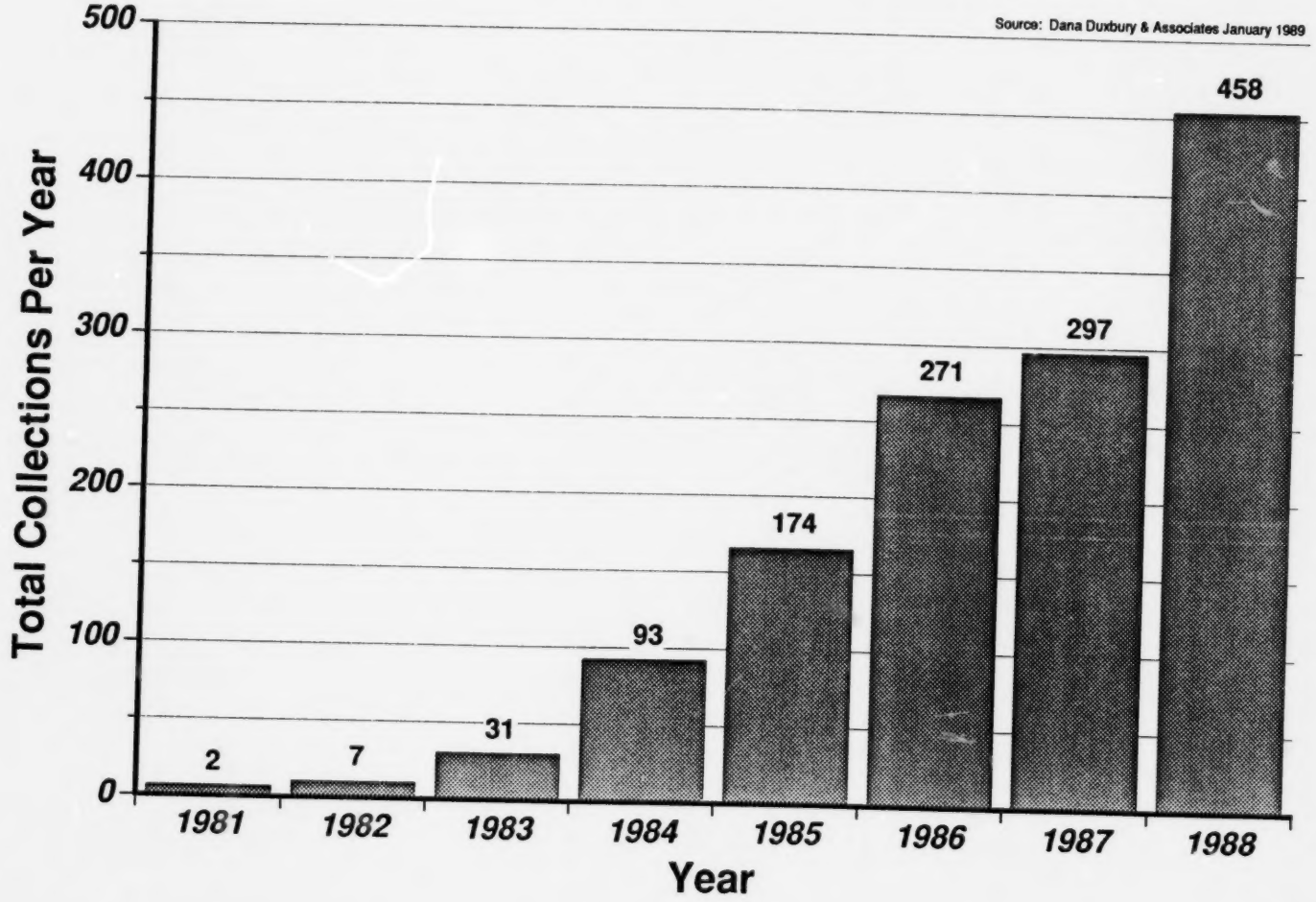


Figure 3. Number of collection programs each year since 1981.

3.10 FUTURE PERSPECTIVES (HHW AND SQGS)

3.10.1 National Perspective

The national policy toward SQGs and HHW is expected to continue to emphasize pollution prevention and to promote EPA's waste hierarchy of reduction, reuse, recycling treatment, and disposal. At a 1987 EPA Waste Reduction Conference in Woods Hole, Massachusetts, John Skinner, Director of the EPA Office of Research and Development (ORD), remarked that Congress has established a national policy making it clear that waste minimization and waste reduction are the highest priorities of waste management in RCRA. The EPA's Pollution Prevention Office was set to promote pollution prevention, and programs such as the RITTA grants program will continue to promote waste prevention and the reduction in both the volume and toxicity of wastes.

Consumer products, such as batteries that contain lead or cadmium, are expected to receive particular attention. The EPA and OTA are studying sources of lead and cadmium in the municipal solid waste stream and means for reducing or eliminating the generation of these wastes.

During the next few years, EPA is likely to continue its role as a catalyst in addressing SQG and HHW issues by providing technical assistance and funding to individual States. Program implementation is now and is likely to continue to be reserved for State and local agencies and organizations.

3.10.2 State/Regional Perspective

State agencies have taken a variety of approaches to promoting the reduction and improved management of SQG hazardous waste and HHW. States also have been promoting the EPA hazardous waste hierarchy through public education and other efforts. Future trends may include labeling laws that focus on hazardous consumer products, deposit systems for items such as batteries, and tax incentives and legislation that promote a reduction in the use of toxic materials.

States can be expected to begin applying more comprehensive approaches to waste management and looking for permanent solutions. California's Tanner Act already requires counties to incorporate SQG and HHW management planning in their hazardous waste management plans. Some States are looking at ways to incorporate SQGs in HHW collection programs. States are also recognizing the importance of providing ongoing outlets for HHW collection. The number of permanently operating (at least once per month) collection programs has more than doubled during the past year; the total is now 27 programs. Rhode Island is currently exploring the possibility of sponsoring a permanent HHW collection facility. Massachusetts and other States are developing guidelines for the operation of such facilities.

3.10.3 Local/Community Perspective

Cities and towns are recognizing that, although one-day HHW collection events are useful as a public education tool, permanent and more cost-effective

solutions are needed. A 1-day collection can cost $100,000 or more, and participation rates are likely to represent no more than 1 percent of the target population. During these events residents often have to wait in line for more than an hour to drop off their HHW. Also, carloads are turned away when the sponsors have met their budget limit or when it is necessary to allow the waste management firm to leave the site before dark.

Whereas 1-day collections are often considered a useful public education tool, they also have been known to have negative ramifications. A study conducted by the Minnesota Pollution Control Agency indicates that the amount of HHW disposed in the regular trash increased after an HHW collection. This phenomenon is believed to have occurred because people learned that many household products are hazardous and were unwilling to store them in their homes while waiting for another HHW collection day.

These factors help to explain why many communities are working to institutionalize collections and to set up permanent HHW collection facilities. At the same time, communities will be promoting waste-reduction and recycling initiatives designed to reduce the need for HHW collections. Collection sponsors like to say that their ultimate goal is to put themselves out of business by reducing and eliminating hazardous waste generated in the home.

With regard to SQGs, communities are expected to continue to sponsor programs to assist small local businesses in reducing and safely managing HHW. Many communities are also beginning to explore the feasibility of incorporating SQGs into their HHW programs. Florida has already provided Amnesty Days for SQGs to dispose of their waste, and similar programs are expected in the future.

SECTION 4

TECHNICAL AND ORGANIZATIONAL ASPECTS OF HOUSEHOLD AND SQG WASTE MANAGEMENT

4.1 SUPPORTING INSTITUTIONS, ORGANIZATIONS, AND AUTHORITIES

The following is a breakdown of institutions, organizations, and authorities involved in household hazardous waste management:

- National: EPA, OTA, and individual members of Congress
- State: Environmental enforcement agencies (State EPA's), environmental planning agencies, water management agencies
- Regional/Municipal/Local: Municipal environmental enforcement agencies, conservation commissions, departments of public works, regional environmental planning agencies, POTWs/sewer districts, fire departments, local emergency response committees, departments of public health
- Private: Waste management companies, environmental organizations, industry associations, individual industrial companies

4.2 PROMOTIONAL ACTIVITIES OR SUBSIDIES

No national or State activities have been identified that subsidize clean technologies as they apply to HHW. Clean technologies promoted by EPA RITTA grants, State technical assistance programs, and Federal and State laws do, however, impose liability on hazardous waste generating activities.

Separate collection of HHW has been subsidized by both national and State governments. Nineteen of the 50 States in the United States have provided funding for separate HHW collections. Dana Duxbury & Associates estimate that as many as one quarter of the more than 1300 collections have received some level of funding. Some States have fully funded, designed, and implemented pilot and continuing collection programs, whereas others have provided only partial financial support. National and State funding sources include EPA Regional Office cleanup grant money, State legislature appropriation monies (including matching grants), State hazardous waste Superfund monies, State solid waste Superfund monies, and a permit fee for retail stores (see Appendix B).

Separate collection of HHW is also promoted by numerous nonsubsidy activities. State-sponsored activities include evaluations/reports; advisory committee reports; education programs; legislation reducing liability associated with HHW collection; studies; and laws, regulations, and guidelines that address HHW (see Appendix B).

According to Joseph Carra of EPA, the Agency supports separate HHW collection; however it takes the position that collection programs must be developed and initiated by State and local governments to fit the needs of each community, with the EPA providing technical assistance to State and local governments.

SECTION 5

CASE STUDIES

5.1 CASE STUDY--AUTO BODY SHOPS

5.1.1 Source

Auto Body Shop Project, Boston, Massachusetts, June 1986 - June 1987. Source and Project Sponsor: Massachusetts Department of Environmental Management (DEM), Office of Safe Waste Management, 100 Cambridge Street, Boston, Massachusetts, 02202. Contact: Michael S. Brown, Director, Office of Safe Waste Management. Phone: (617)727-3260.

5.1.2 Industry Profile

Approximately 65,000 independent auto body shops and 25,000 new car dealers have body repair shops in the United States. In the Commonwealth of Massachusetts, approximately 2350 firms do body repair work or paint cars. Auto body repair involves the use of mechanical and chemical techniques to straighten, replace, and protect metal and plastic.

Hazardous wastes generated by auto body shops are likely to include parts cleaners (e.g., mineral spirits), waste oil and grease, paint wastes, rust removers, and antifreeze. Lacquer thinner is the major waste stream generated by the industry.

The Massachusetts auto body industry consists of a large number of firms dispersed throughout the State. The industry generates several waste streams. Only a small percentage of shops probably do not generate any hazardous waste. Most generate amounts that would qualify them as very small quantity generators (VSQGs) of hazardous wastes or small quantity generators (SQGs); i.e., they generate less than 1000 kilograms per month.

An informal DEM survey (not statistically valid) revealed information about waste generation and management activities of the auto body industry in Massachusetts (see Tables 2 and 3, respectively).

5.1.3 Project Scope

The Massachusetts Department of Environmental Management (DEM), a nonregulatory environmental agency, proposed a five-part project consisting of the following:

TABLE 2. HAZARDOUS WASTE GENERATED AND REPORTED BY AUTO BODY SHOPS

Waste generated		Number reporting	Percent reporting
Waste streams (multiple answers possible)			
Solvents		357	77
Paints and filters		282	61
Waste oil		159	34
Quantities generated/respondent (solvent and paint waste)			
None		109	23
> and ≤ kg		282	61
>5 and ≤100 kg		61	13
>100 and ≤1000 kg		14	3
>1000 kg		-	-
	TOTAL	466	100
Quantities generated/respondent (waste oil)			
None		307	66
> and ≤ kg		49	11
>5 and ≤100 kg		35	8
>100 and ≤1000 kg		64	14
>1000 kg		11	2
	TOTAL	466	101[a]

[a] Total does not equal 100 because of rounding.

TABLE 3. MANAGEMENT PRACTICES

Type of practice	Solvents		Paint/Filters		Waste Oil	
	No.	%	No.	%	No.	%
Reuse	64	21	39	15	14	9
Recycle	20	7	8	3	7	4
Evaporation	46	15	11	4		
Trash disposal	40	13	103	40	6	4
Ground disposal	3	1	1	<1		
Licensed hauler	100	33	70	27	112	69
Storage	25	8	19	7	5	3
Incineration	6	2	6	2	18	11
TOTAL	304	100	257	98	162	100

[a] Source: Massachusetts Department of Environmental Management, Office of Safe Waste Management, Final Report, Auto Body Shop Project, June 1987.

1) Defining the target population and key participants.

2) Surveying waste generation and management, particularly source reduction opportunities.

3) Establishing collection programs, such as milk runs and transfer facilities.

4) Conducting workshops and outreach programs.

5) Evaluating compliance and waste management changes.

Project goals were to determine the number of auto body shops in the Commonwealth, the hazardous waste generation rates, and the level of initial compliance with hazardous waste regulations and to achieve at least a 35 percent increase in compliance as measured by notifications of hazardous waste activity, documentation of source reduction efforts, and the establishment of ongoing collection methods tailored to SQGs.

The DEM proposed to enlist the help of trade associations, safe waste management coalitions, transporters, and regulators to help identify auto body shops in the Commonwealth, to evaluate industry processes and the potential for feasible methods of reducing waste generation, to establish "milk-run" type collection programs for interested generators, and to provide generators with information on regulations, waste management methods, and offsite treatment and disposal.

In conjunction with the State environmental regulatory agency, the Department of Environmental Quality Engineering (DEQE), DEM was to evaluate initial compliance among the targeted shops, to determine typical violations of the regulations, and to analyze changes in compliance over the term of the project. The final phase would be the preparation of a report evaluating the project elements to determine how the successful components might be applied to other States and where improvements are needed.

5.1.4 Identification of Needs

The primary compliance problems identified concerned the low rate at which shops notified the State regarding waste generating activity, the suspected high rates of illegal disposal, improper storage and marking, and the lack of cost-effective disposal alternatives for the smallest generators. The concerns of local and regional agencies focused on identifying SQGs, getting businesses into the regulatory system, searching for cost-effective alternatives for reducing or eliminating waste that may pollute ground water, and identifying affordable disposal alternatives for local businesses. Auto body shop owners cited access to information, applicability of hazardous waste regulations to their shop situations, and the costs of proper management and disposal as major concerns.

5.1.5 Program Implementation/Results

The DEM structured an outreach and technical assistance program designed to highlight the segments of the industry least likely to be in compliance and most in need of assistance. According to the Director of DEM's Office of Safe Waste Management, the cost of the program was estimated to be $80,000. The program consisted of the following:

1) Identifying the needs of the targeted generators and coordinating efforts with other agencies.

2) Conducting an initial mailing.

3) Offering technical assistance on source reduction and milk runs.

4) Conducting workshops throughout the Commonwealth.

5) Conducting a followup mailing.

Efforts were coordinated with the DEQE, which cooperated by conducting additional inspections of auto body shops.

Initial Mailing--

An initial mailing was sent to 1870 auto body shops that had failed to obtain an EPA Identification Number. The letter was designed to inform the target population that DEM was working to help auto body shops meet their hazardous waste responsibilities, that the number of shop inspections by the DEQE would be increasing, and that workshops would be forthcoming. A survey regarding hazardous waste management practices was included. At the outset of the project, approximately 650 auto body shops had obtained EPA Identification Numbers. Within 1-1/2 years of the project implementation, more than 1200 shops were registered and had an EPA Number, which represents a substantial increase in the number of auto body shops now in the regulatory system.

Technical Assistance Program--

Technical assistance efforts focused on potential waste minimization activities, proper storage, and cost-effective off-site disposal. Technical information was developed through literature reviews, product solicitation, contacts with industry and suppliers, and discussions with body shops that had attempted to revise their procedures. The DEM stressed the need for adequate managerial attention in auto body shops to ensure that waste reduction and management programs were being properly addressed.

Among achievable waste minimization efforts was altering the work processes to reduce solvent use and waste. The greatest gains could be made at shops that cleaned their spray gun equipment by filling the gun cup with solvent and spraying the liquid into the room air or a ventilation duct. Other practices for which alternatives might be available to effect reductions included using gun wash tubs that were not closed systems, conducting painting operations in an unorganized manner, and using low-quality solvents.

Solvent distillation units costing between $2000 and $3000 were recommended to some auto body shops as a means of recovering solvents. The DEM concluded that these units were economically feasible for only the larger firms. Each of several units the DEM identified could process approximately 5 gallons in an 8-hour period.

Identified hazardous waste storage problems included poor housekeeping, lack of proper labeling, failure to protect against explosions and fires, and lack of emergency equipment. The DEM developed a model storage approach for the suggested use of shops. The approach included the following elements: developing an enclosed, explosion-proof space; adhering to good housekeeping procedures; and identifying a hazardous waste storage area that could be enclosed, protected, and well marked. The DEM suggested a system for grounding all drums and tanks. Storage space for hazardous waste could be indoors or out; however, fire regulations encourage outdoor placement. Specially constructed storage areas or the use of an ocean-going shipping container was recommended as especially desirable. Generators were encouraged to use safety containers with nonsparking funnels in paint rooms for satellite accumulation, to post warning signs, and to improve tracking of waste from generation to storage. Shops were advised to fence off storage areas, to limit access, to cover drums, to provide an impervious surface for storage, and to provide emergency equipment.

The DEM identified six contractors who expressed a willingness to provide hazardous waste disposal services to auto body shops. Two "milk run" services were identified. Milk runs involve scheduled transporter pickup of single or limited waste streams from geographically concentrated generators.

Workshop Program--

The DEM sponsored nine auto body workshops in Massachusetts and five workshops for vocational schools with noncommercial body shops. Overall, workshop attendance totaled approximately 310. Although each workshop agenda was different, the typical approach was to have a DEM representative introduce the project and discuss the general regulatory environment and methods of improving waste management; to have an inspector from DEQE review the regulations in more detail and describe the process of inspection; and to have representatives from hazardous waste transporters and solvent still manufacturers talk about their services and products. Questions and answers were encouraged during each talk and at the end of the final presentation. Handouts were provided.

5.1.6 Conclusions/Recommmedations

Conclusions--

The auto body shop industry is composed of a large group of small businesses, all of which have the potential to generate the same waste streams, which vary only in quantity. Essentially, the same problems were encountered by all firms, whether large or small: coping with a myriad of regulations designed for large chemical production plants, reducing waste generation where no feasible substitutes exist for raw materials used in the body shop processes, and finding cost-effective offsite management alternatives.

Recommendations--

The following actions are recommended to deal with the problems:

- Application of an enforcement-driven model to the program if adequate resources can be made available. An inspection process could include referral to a DEM assistance program. Project costs would increase by at least $200,000, which is a serious barrier to applying the enforcement-driven approach.
- Establishment of a research and development program targeted at meeting SQG needs.
- Provision of increased management alternatives for the smallest generators, such as collection stations for nonhousehold wastes.
- Exploration of the possibility of requiring mandatory participation in a milk run program. This would create a reliable market for contractors and could result in lower costs for generators.
- Establishment of greater coordination between the EPA and outreach providers. At a minimum, EPA might want to consider building a library of reports on SQG assistance projects and distribute an annotated bibliography to agencies and interested individuals.

5.2 CASE STUDY--BATTERIES

5.2.1 Source

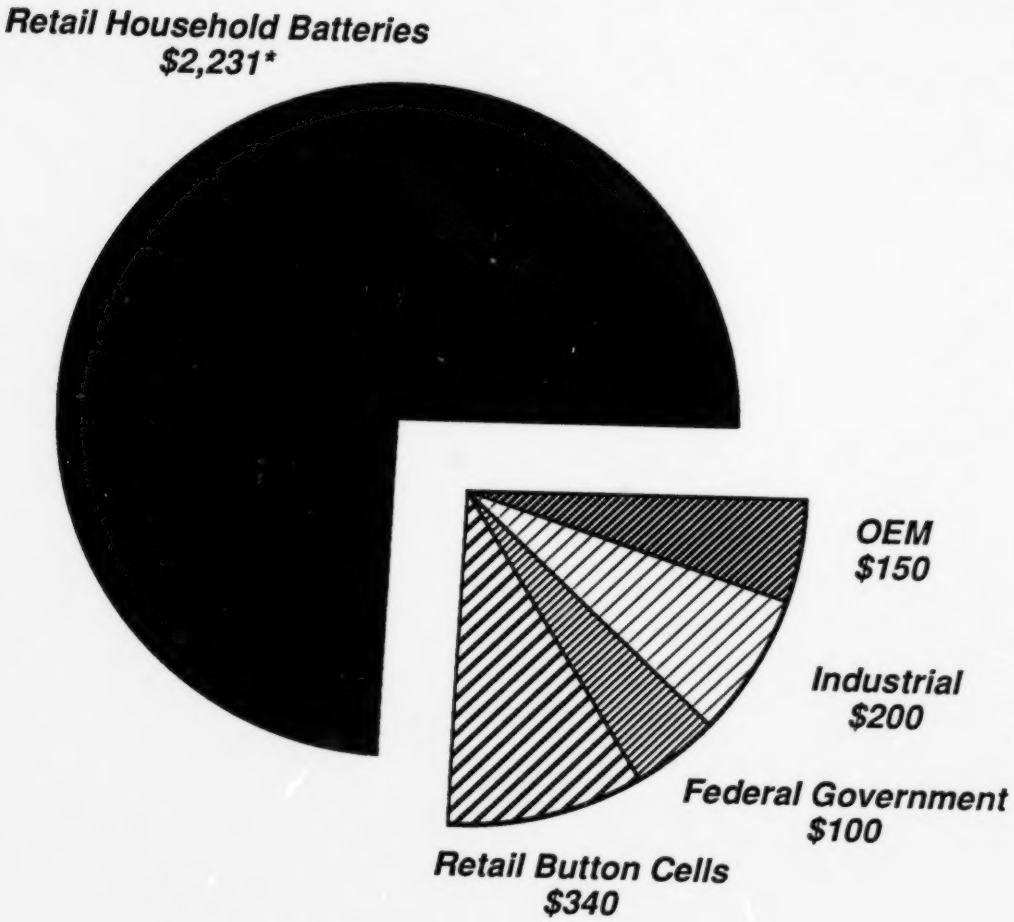
Household Battery Collection Program, New Hampshire/Vermont, Spring of 1987. Source and Project Sponsor: New Hampshire/Vermont Solid Waste Project, Room 336, Moody Building, Claremont, New Hampshire 03743. Contact: Carl E. Hirth, Recycling Manager/Planner. Phone: (603)543-1201.

5.2.2 Industry Profile

In the United States, there is an interest in the collection, segregation, and recycling of used batteries. Batteries produced and used in the United States include household dry-cell batteries and lead-acid batteries.

Dry-Cell Batteries--

A $3 billion retail battery market exists in the United States. More than two-thirds of the sales in 1987 ($2,231 million) were for retail household batteries. In 1987, 59 percent of the total retail market was for alkaline batteries, 26 percent for heavy-duty batteries, and 15 percent for general-purpose batteries. Figures 4 and 5 present details regarding the U.S. battery market. Note: The National Electrical Manufacturers Association (NEMA) would not release figures on sales of nickel cadmium batteries in the United States.



NOTE: All numbers are in millions of retail dollars

* Six popular household sizes (D, C, AA, AAA, 9 volt and lantern batteries) make up 98% of all retail battery sales.

Source: Rayovac Corporation 1988

Figure 4. Breakdown of the 1987 U.S. battery market.

- D, C and AA sizes account for 84% of today's applications.
- General Purpose is heavier in traditional D and C size flashlight and radio applications.
- Alkaline is heavier in AA and AAA electronics applications.
- Heavy Duty tends to be similar to the total usage pattern--a good value alternative for all applications.
- AA and AAA are the fastest growing sizes.

SIZE	GENERAL PURPOSE	HEAVY DUTY	ALKALINE	TOTAL
D	37%	26%	18%	21%
C	24	22	17	19
AA	26	38	48	44
AAA	—	—	8	5
9 Volt	10	11	9	10
6 Volt	3	3	—	1
TOTAL	100	100	100	100

Figure 5. The 1987 retail market by size.

Source: A. C. Nielsen, NFO Consumer Purchase Diary

Mercury is used in the following dry-cell batteries:

- Mercuric oxide batteries
- Silver oxide batteries
- Alkaline manganese batteries
- Carbon zinc batteries
- Zinc air batteries

Also produced and used in the United States are nickel-cadmium dry-cell batteries, which do not contain mercury and can be recharged. Part of the attention given these batteries was due to the presence of cadmium in solid waste incinerator ash.

In 1986, the production of batteries accounted for 24 percent of the total cadmium and 45 percent of the total mercury consumed in the United States. A marketing study by the Duracell Corporation, however, indicates that by 1990, 75 percent of all the batteries purchased in the United States will be alkaline.

Level of risk--Views in the United States vary regarding the threat to public health and the environment associated with the disposal of dry-cell batteries in landfills and incinerators. At EPA's Third National Conference on HHWM, Dr. Allen Hershkowitz, Director of Municipal Recycling Associates, pointed to one Swedish study that concluded that mercury from batteries is responsible for 60 to 70 percent of all the mercury coming from incinerators and 35 percent of all background levels of mercury in the environment. A study of pregnant women in Sweden indicates that mercury emissions pose a health threat to the public. He said that these studies led the Swedish government to require the collection and separation of batteries from the municipal solid waste stream.

Raymond Balfour, Vice President of Rayovac Corporation, a U.S. manufacturer of batteries, provided an industry perspective at EPA's Third National Conference on HHWM. He cited six U.S. and European studies conducted between 1975 and 1988 that indicate that household dry-cell batteries do not pose a threat to public health or the environment when they are disposed of in landfills or incinerators. Balfour also cited industry projections that mercury usage in U.S. consumer battery production would decline steadily during the late 1980s (as shown in Figure 6). He noted that whereas the September 1988 draft report by EPA's Municipal Solid Waste Task Force made many references to lead-acid batteries, it did not single out household batteries as a matter of concern.

Rayovac and the other dry-cell battery companies that belong to the National Electrical Manufacturers' Association are concerned with the consequences of proposed battery collection and disposal programs. Batteries that residents accumulate in homes before they bring them to a collection depot pose a risk to human health (especially children) if they are ingested or implanted in the nose or ear. Electrical current passing between the terminals can set off a chemical reaction and cause a chemical burn in the surrounding body tissue.

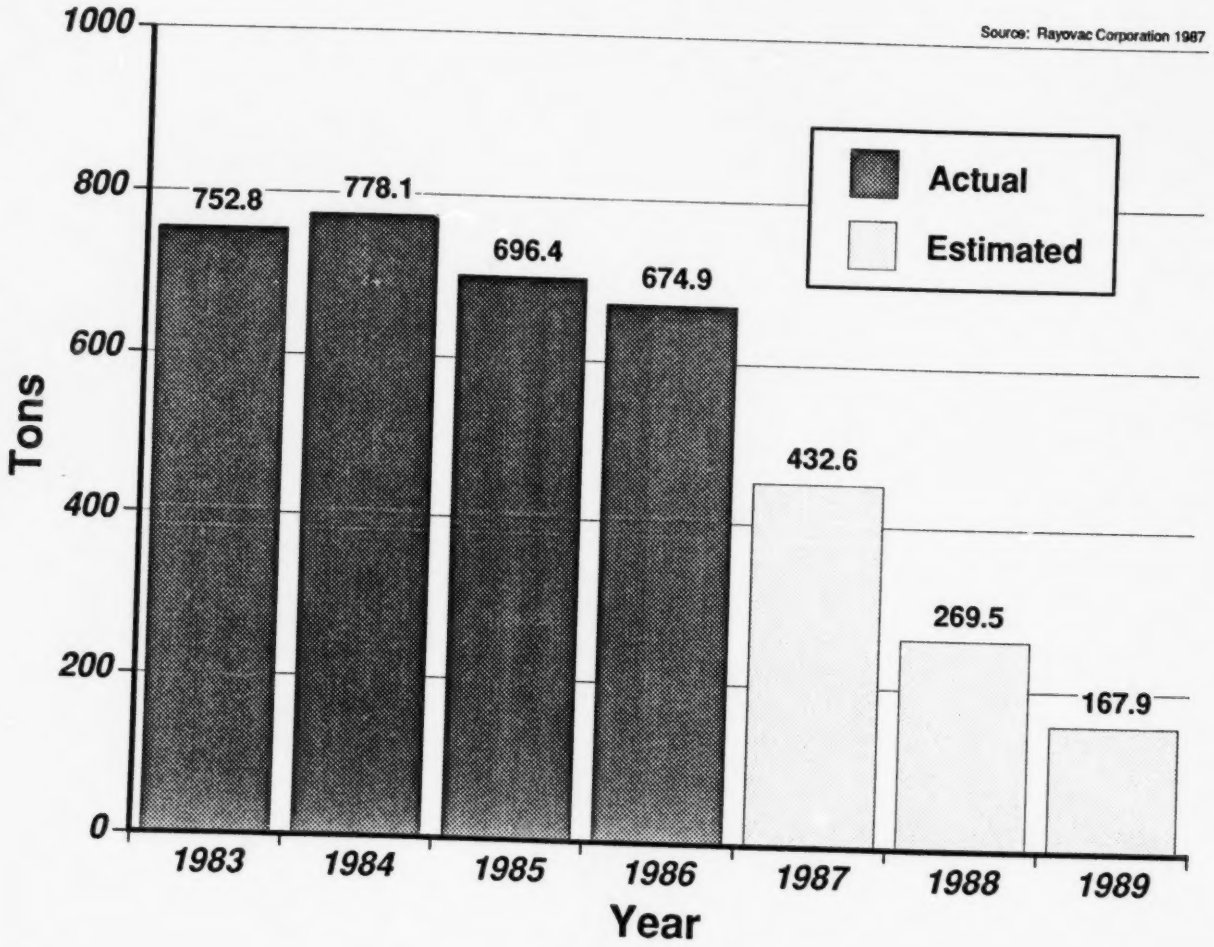


Figure 6. Use of mercury in U.S. consumer battery production.

Balfour further stated that the aggregation of large quantities of batteries will result in physical and electrical contact between batteries. This contact generates heat and hydrogen gas, which creates the risk of fires or explosions if sufficient ventilation is lacking. An example of such an explosion and resulting injury occurred in 1985.

Dry-cell battery collection/recycling--Battery collection activities have occurred in at least six States. In several cases, efforts have been targeted for the collection of mercury and silver oxide button batteries; at least one U.S. company, Mercury Refining Company in Latham, New York, has begun to recycle batteries for their mercury content. In 1987, legislation was proposed in two States (California and Iowa) to require the source separation of household batteries; however, the legislation did not pass. A Congressman in New York State has proposed a $0.25 deposit on each battery sold in the state as an incentive for consumers to return spent batteries and to promote recycling by manufacturers.

The dry-cell battery industry takes the position that no evidence of environmental or health risks exists that indicates a need to collect and recycle batteries. According to Raymond Balfour, the only U.S. markets for recyclables are for silver and mercuric oxide batteries, and these markets are likely to decrease with the continuing reduction in the use of mercury.

Lead-Acid Batteries--

The lead-acid batteries produced and sold in the United States are used in cars, trucks, and electric vehicles (e.g., golf carts). The Battery Council International reported that total domestic sales of original batteries (batteries included in new automobile purchases) was 13.1 million in 1987. An additional 59.9 million replacement batteries (batteries not included in the purchase of automobiles) were sold during the same year.

Lead-acid batteries are recycled in the United States. Speaking for the Secondary Lead Smelters Association and the Battery Council International at the EPA's Third National Conference on HHWM, Robert Steinwurtzel noted that there are approximately 23 secondary lead smelters in the United States today, down from more than 60 smelters in 1980. Spent lead-acid batteries represent the major raw material used by the industry, so the industry has an incentive to see that lead-acid batteries are recycled and not disposed of in municipal landfills.

According to Steinwurtzel, about 80 percent of used batteries are being recovered and recycled by the secondary lead industry. The secondary lead industry recovers the lead and neutralizes the sulfuric acid. The plastics casings are recycled and sold back to plastics manufacturers, and the rubber is recovered or rendered nonhazardous and properly disposed of.

5.2.3 New Hampshire/Vermont Household Battery Collection Program

In the spring of 1987, the New Hampshire/Vermont (NH/VT) Solid Waste Project, a consortium of 26 municipalities in the two states that joined together to develop and implement a regional solid waste management solution, initiated a program targeting the removal of household batteries from the

solid waste stream. The population of the Project area is around 60,000 people. The goal of the program is to reduce concentrated sources of metal in the waste and return to industry those batteries that can be recycled.

The Project initially requested Signal Environmental Systems' Engineered Materials Research Center to research the leading sources of lead, cadmium, and mercury in municipal solid waste and the potential for reducing the volume of these metals through recycling. Conclusions offered in the Signal report indicated that excluding all types of batteries from municipal solid waste would have a major impact on the amount of mercury, cadmium, and (to a lesser extent) lead in the emissions and ash residues of municipal waste-to-energy plants. Another benefit of excluding batteries would be the presence of less zinc in the effluent because most disposable batteries also contain zinc. It was further concluded that the most effective recycling programs should concentrate on all types of batteries.

The NH/VT Project responded to the conclusions in the report by designing its Household Battery Collection Program. This program is funded by 28 participating municipalities. The Battery Collection Program shares a $15,000 operating budget with another New Hampshire/Vermont Project waste management program.

The primary purpose of the Battery Collection Program is to remove household batteries from the municipal solid waste stream. The program is set up through stores that sell dry-cell batteries in the region, and it targets household dry-cell batteries (not automotive batteries). Approximately 70 stores and recycling centers in the region initially agreed to display a 5-quart silver bucket with a battery collection logo (see Figure 7) adjacent to their battery display and to encourage consumers to return their used batteries. Currently, about 80 stores participate in the program, and the 5-quart buckets have been replaced with 10-quart buckets to provide adequate storage for the used batteries.

Local civic organizations such as the League of Women Voters, the Retired Senior Volunteer Program, and the Boy Scouts volunteered to collect the batteries from the buckets on a routine basis. Initially, buckets were emptied every 2 months, but more frequent servicing will be required as participation increases. Boy Scout troops have segregated the batteries containing mercury and silver for recycling.

Recyclable batteries have been sent to Mercury Refining Company in Albany, New York. Because of the limited staff time available to sort and send out batteries for recycling, the vast majority of batteries are stored and disposed of by a licensed hazardous waste contractor. Seven pounds of recyclable batteries were sent to Mercury Refining Company during the first 6 months of the Program.

Batteries destined for disposal are stored at the Claremont Transfer Station in labeled 55-gallon drums. Northeast Solvents, a hazardous waste contractor, picks up the drums during the scheduled spring HHW day held at the site each year. This year, a special trip was necessary in the fall

Figure 7. New Hampshire/Vermont project battery collection logo.

because of the increase in the number of batteries collected. The batteries are disposed of at a Canadian landfill.

The first servicing of the battery collection buckets, which occurred 2 months after they were set out in April, resulted in a return of approximately 130 pounds of household batteries. Between May 1987 and September 1988 the Project collected more than 9 tons of household batteries.

The total startup cost for the Program was $942. This includes the cost of 125 collection buckets, logo decals, advertising, and mileage. Disposal costs for nonrecyclable batteries for the 6-month period ending in October 1987 were $300/55-gallon drum, or $750 total. In 1988, disposal costs were $3300 for 6.5 tons of batteries. The cost of staff time is estimated to be $5000 per year.

The Project planners consider the Battery Collection Program a great success. An estimated 8 percent (by weight) of the total battery waste stream of the targeted service area is captured by the collection program, which significantly reduces the amount of batteries disposed of in the solid waste stream.

5.3 CASE STUDY--USED OIL

5.3.1 Source

Used Oil Curbside Collection Program, Milpitas, California, September 1986. Source and Program Sponsor: Browning Ferris-Industries (BFI), P.O. Box 1987, San Jose, California, 95108. Contact: Mr. Lynn B. Ingraham, Safety Manager. Phone: (408)432-1234.

5.3.2 Generation of Used Oil In the United States

Information gathered by EPA in 1983 indicates that approximately 1.2 billion gallons of used oil is generated annually. Of this total, 700 million gallons comes from lubricants such as engine, gear, and turbine oils. Roughly half of this 700 million gallons is generated by do-it-yourself (DIY) oil changers who change the oil in their automobiles. About 500 million gallons comes from industrial uses such as hydraulic fluid, metal working fluids, insulating oils, and coolants. This industrial segment of used oil generation is fairly well controlled.

At EPA's Second National Conference on HHWM, Donald Gilson, Senior Environmental Specialist for Chevron USA in San Francisco, California, provided the following information on how used oil is handled in the United States:

- Reprocessed for burning--49 percent. (Oil is collected through simple filtration; water is removed and then mixed with virgin oil, depending on the level of contaminants.)
- Dumping--33 percent. (Soil, sewer, landfill, trash)

- Road oiling--6 percent. (This is no longer considered an environmentally acceptable method.)
- Re-refined oil--5 percent. (Oil is collected and goes through a chemical processing procedure, usually vacuum distillation or acid treatment, and another filtration; additives are put in, and it is then sold as "new" product.)
- Onsite recycling--4 percent. (Waste oil burners for heating)
- Nonfuel--3 percent. (Base stock for asphalt)

Gilson stated that do-it-yourselfers account for about half of the dumping of used oil. The oils are frequently dumped in backyards, basement drains, and the trash.

5.3.3 Regulatory History

In 1980, Congress passed the Used Oil Recycling Act, which directed EPA to promulgate regulations by October 15, 1981, to protect against hazards associated with recycled oil. Under the Act, EPA was to ensure that such regulations do not discourage recovery or recycling of used oil. The EPA was further directed to determine whether used oils should be classified as hazardous waste.

In November 1985, EPA published a two-part proposal in the Federal Register that suggested listing used oil as a hazardous waste and establishing special standards for used oil recycling. In 1986, after receiving public comments, EPA issued a used oil rule. The rule did not list recycled oil as a hazardous waste, but it required disposal of oil to be handled as a hazardous waste. In May 1986, EPA specified that used-oil mixtures containing 1000 ppm of total halogens are subject to the full hazardous waste regulations. The rule prohibits the use of chlorinated solvents in the treatment of used oil. The basis for this decision was that the label of "hazardous waste" might create a stigma that would discourage recycling and its environmentally beneficial effects.

In the fall of 1988, the U.S. Court of Appeals ruled in favor of a Natural Resources Defense Council/Association of Petroleum Re-refiners/ Hazardous Waste Treatment Council lawsuit by rejecting the validity of EPA's decision not to list used oil as a hazardous waste so as to avoid the "stigma effect." The EPA was ordered to base its decision regarding whether to classify used oil as a hazardous waste on scientific data.

The EPA is currently reviewing the options available after the court decision. Susan O'Keefe of the EPA's Office of Solid Waste noted that should used oil be listed as a hazardous waste, the SQG generation and transporter standards of RCRA will not apply to used oil if such oil is recycled.

In the meantime, EPA is supporting State and local used oil programs through a clearinghouse on used oil initiatives. The EPA publishes the Used Oil Recycling Bulletin and is working on a manual entitled "How to Start a Community Used Oil Recycling Program." The Agency is also preparing several

pamphlets that can be distributed by State and local programs. One pamphlet is for service stations and other facilities that collect used oil centrally; the other is a handout for the DIYer on how to recycle used oil properly.

Individual States have also passed regulations regarding used oil. California, Massachusetts, Missouri, New Jersey, New York, South Carolina, Rhode Island, and Vermont regulate waste oil as hazardous. Illinois, Maine, Michigan, Minnesota, Washington, and Wisconsin regulate waste oil as a special waste.

5.3.4 Recycling Used Oil

In the United States, the recycling of used oil includes burning for energy as well as reusing oil (re-refining). The re-refining process involves complex technical operations and processes to produce a contaminant-free lubricant base oil. It also produces byproducts.

At EPA's Third Conference on HHWM, John Nolan, President of the National Oil Recycling Association based in Reston, Virginia, noted that the oil-recycling industry is not a highly organized industry. It is made up of small businesses ranging from very small (e.g., the owner of a single tank truck who collects oil in a few small cities and towns) to a recycling plant that processes as much as 20 million gallons per year. The EPA has identified approximately 700 used-oil collection companies and 240 recycling companies that produce fuel oil from waste oil. Most of these recyclers process less than 3 gallons per year.

Mr. Nolan commented on the variety of industrial users of recycled oil fuel, including steel mills, cement kilns, power plants, greenhouses, marine diesel engines, industrial boilers and furnaces, and asphalt plants. Nolan said that the Nation's 3000 oil-fired asphalt plants are a particularly attractive market because they operate in virtually every county in the country.

Also at EPA's Third Conference on HHWM, George Booth, Executive Director of the Association of Petroleum Re-refiners based in Buffalo, New York, reported that in the 1950's, more than 100 re-refiners were producing in excess of 300 million gallons of oil per year. Today, only four U.S. companies and one Canadian company are re-refining approximately 60 million gallons of used U.S. oil per year. According to Booth, re-refining involves distillation processes that include dehydration, vacuum fuel/light oil stripping, and vacuum distillation. It also includes finishing processes such as hydrotreating and fractionation. Hydrotreating is a relatively new process that involves final purification of the used oil by reacting the hydrogen with the halogens, sulfur, oxygen, and other remaining compounds.

The decline in used oil recycling in the United States may be explained in part by the economics of recycling. John Nolan of the National Oil Recycling Association maintained that for a viable market to exist for recycled oil, the price of virgin oil must be high enough for the recycler to be competitive. A discount is necessary because the customer risks high water content or dirt that can clog a burner when recycled oil is used.

between 1980 and 1984, a strong market for recycled oil existed. After OPEC (Organization of Petroleum Exporting Countries) lost its grip on the market, however, the price for crude and used oil plunged. Nolan remarked that today collectors can no longer pay used oil generators for the used oil; therefore, the economic climate has largely removed the incentive for used oil recycling.

5.3.5 Curbside Collection in Milipitas, California

In September 1986, Browning-Ferris Incorporated (BFI), a solid and hazardous waste contractor, initiated a curbside motor oil collection program in Milpitas, California, (a community of 48,800) in response to the following concerns:

- Oil was contaminating residential trash destined for sanitary landfills (waste oil is regulated as a hazardous waste in California).
- Oil spills and sprays were occurring when oil containers were compacted in BFI garbage trucks.
- Oil was posing a safety hazard to collection workers, staining uniforms, and leading to productivity losses.

Browning-Ferris offered to add a voluntary curbside collection program to the Milpitas contract for solid waste pickup. Milpitas agreed to include the program in the contract, but told BFI that they did not expect the program to work.

The city fire department was contacted by BFI to find out if the department would distribute one-gallon milk containers (provided by BFI) for residents to use to hold the used oil that would be left at curbside. Residents were also permitted to use their own bleach bottles for the oil. The cartons are also available at BFI's district office.

Program Implementation--

The public relations campaign begun by BFI invited residents to separate used oil and put it in containers at the curbside with their trash. The targeted population is the estimated 60 percent of the 15,000 households that are do-it-yourself oil changers.

The company initially retrofitted its refuse collection vehicles with 9-gallon holding tanks on the undercarriages in anticipation of a 1 percent participation rate. Large-mouthed tanks were mounted above the hydraulic system of the sanitation trucks. The large mouths on the tanks allow the drivers to pour the oil without spilling any on the ground. Spigots on the tanks allow BFI to drain the oil when the truck returns to the company yard.

After residents' oil cartons are drained, BFI disposes of the containers with the trash. The cartons are thrown away because children may play with the empty cartons and spill the small amount of residual oil that

is left after the carton has been drained. Thus, BFI concluded that reusing the cartons was not worthwhile.

At the end of each collection day, sanitation truck drivers return to the BFI yard and drain the oil into a 2000-gallon underground holding tank, where it is commingled with the company's own waste oil. The oil is put through a strainer before it is poured into the holding tank. The containers that are attached to the trucks are cleaned daily to keep the spigot from clogging. The used oil is pumped out of the holding tank and sent to an oil recycler once every week.

Monitoring the Program--

The BFI truck drivers monitor residential compliance with the program. If they notice that some residents are still hiding oil in the trash, drivers mark down the address of such residents on their route sheet. On that same day, BFI sends a letter, with a carbon copy to the fire department, reminding the resident that the used-oil-collection program is in effect.

Within a week after the letter is sent, a representative from the fire department visits the household and informs them that they are not properly disposing of their oil. These personal visits have proved very effective in drawing new participants into the program.

Program Results--

During the first few months, the 9-gallon containers were adequate to handle the 1 percent participation rate that had been expected. Over time, however, the program gained popularity because BFI had succeeded in getting across its educational message to the public. After several months of the program, BFI was inundated with used oil. By the end of 1988, Milpitas had achieved approximately a 48 percent rate of participation by the targeted population, which has resulted in the collection of about 12,500 gallons of used oil each month.

The 9- to 10-gallon holding tanks quickly became inadequate for the volume of oil that was made available for collection. Additional 20- or 30-gallon tanks were attached to truck undercarriages to supplement the original containers.

The results for 1987 are as follows:

Milpitas population (September 1988))	-48,800 people
Amount of oil collected	-12,595 gallons
Disposal cost per gallon ($0.10)	-$1,295.50
Estimated number of households	-15,000
Average amount per participating household	-1.2 gallons

It costs BFI $0.10 per gallon to have the oil recycled. This cost is added to the $1,700 startup cost for the program and the minimal cost of

supplying the 1-gallon milk containers ($0.01 each) when computing the total costs of the collection program.

According to BFI, the benefits of the program have more than compensated the company for the costs they have incurred. The benefits include:

- Extending the life of the landfill operated by BFI.
- Improved relations between BFI, State regulators, and the community.
- Fewer incidents of sanitation workers getting splashed with used oil.
- Less worker compensation losses associated with accidents involving oil disposed of in residential trash.
- Separation of additional hazardous materials. (As a positive side effect of the program, residents began to separate out hazardous materials, in addition to oil, from the regular trash.)

5.4 CASE STUDY--PAINT

5.4.1 Source

San Diego County Paint Collection Program, San Diego, California, 1986 - Source and Program Sponsor: San Diego County Department of Health Services, Division of Environmental Health Protection, Hazardous Materials Management Unit, San Diego County Department of Health Services, San Diego, CA 92138. Contact: Linda Pratt, Hazardous Materials Specialist. Phone: (619)236-2222.

5.4.2 Paint Generation in the United States

The National Paint and Coatings Association (NPCA) provided the following statistics on the amount of paint consumed in the United States:

- The United States currently consumes about 1 billion gallons of paint and coating products each year.
- Architectural coatings formulated for use on new and existing residential, commercial, institutional, and industrial structures account for 46.5 percent (465 million gallons) of the paint consumed in the United States.
- Sixty percent (27.9 million gallons) of the paint is used for residences.
- Approximately 66 percent (18.5 million gallons) of the residential paint portion is used by do-it-yourself painters, and the remaining

portion (9.4 million gallons) is used by professional painters and contractors.

5.4.3 Paint Types and Associated Hazards

According to the NPCA, 73 percent of the paint consumed in the United States is water-based (latex), and 27 percent is solvent- or oil-based.

Each type of paint presents different hazards. At the EPA's Third Conference on HHWM, Ronald Child of California Products Corporation, a Massachusetts paint manufacturing company, stated that solvent-based paints are hazardous because the mineral spirits in these paints are flammable and poisonous. When collected and consolidated in large amounts, they are generally regarded as hazardous wastes on HHW collection days. Furthermore, in some cases collected paints have been found to contain PCBs (polychlorinated biphenyls).

Solvent-based paints generated as waste by households, however, are not technically regulated by RCRA Subtitle C as hazardous because HHW is exempt from regulation. These paints may be subject to State regulation, however. For example, the amount of solvent-based paint consumed in California has been declining because of strict air quality controls on volatile organics.

According to Ronald Child, latex paints seldom contain anything hazardous. They are considered hazardous, however, if they contain more than 1 percent ethylene glycol, which evaporates when paints are dried. Concerns, have arisen, however, regarding the mercury content in latex paint, as mercury has been used to inhibit spoilage. Although Robert Foreman of NPCA indicated (at the same conference) that the use of mercury in paint is declining, he also stated that the label on the can does not indicate whether the paint contains mercury.

The lead content in paint used in the United States has also caused concern. Regulations limit the amount of lead allowable in paint, and programs to remove lead paint from buildings are in effect.

5.4.4 Management Options

Latex and solvent-based paints are generally received in large quantities on HHW collection days. The percentage of paint received during collections compared with other household products is estimated as high as 60 to 80 percent. Thus, the cost of managing and safely disposing of paint received on collection days is an important concern for collection sponsors.

Some communities have attempted to focus their efforts by holding "paint-only" collection days. Paint exchanges and referrals have also been sponsored to promote the redistribution of unused paint. For example, the Minnesota Pollution Control Agency operates a referral program that attempts to match potential suppliers and users of paint that might otherwise be disposed of.

Paint that is collected for disposal on HHW collection days is often consolidated in an effort to minimize disposal costs. Some waste-management companies have developed mechanical devices that are used to scrape paint out of the original containers, and then drain it into drums of consolidated paints. A permit may be required before consolidating paints because consolidation is a form of waste treatment.

The HHW collection sponsors have made efforts to recycle and treat as well as safely dispose of collected paint. Landfill bans on liquid wastes favor the use of incineration over landfilling as a treatment and disposal option.

The extent to which paint can be reprocessed effectively is a subject that has generated some debate. The NPCA has argued that paint recycling is difficult to accomplish because consumed paint wastes are not a reliable source of raw materials. The Association maintained that this is true because consumer paint products are based on well-researched formulations designed to provide quality performance. The NPCA maintained that consistently achieving the desired performance properties necessitates that manufacturers use raw materials of known quality.

Nevertheless, paint reprocessing efforts have proceeded. For example, a project conducted in Seattle, Washington, by Philip Morley & Associates with the cooperation of the NPCA, is exploring opportunities for reprocessing latex paint received during HHW collections. A reprocessed paint has been produced that seemingly performs well as an interior paint, based on standard paint industry tests.

Latex paint collected at ongoing collection sites in San Bernardino County, California, is submitted to a local manufacturer, where the paint is used in the production of an industrial-grade primer. This primer has then been used by various county agencies. Solvent based paint collected in the county is sent to a solvent-recovery plant. After all the solvents are recovered, the waste sludge is incinerated. Paints collected in San Diego and San Francisco, California, have also been processed for redistribution.

5.4.5 Paint Collection in San Diego County, California

The HHW program in San Diego County is administered by the County Department of Health Services, Hazardous Materials Management Division. Funding for the program is shared by the City of San Diego through the Water Utilities Department and by the County Department of Public Works through the Solid Waste Division.

The program sponsored 10 "paint collection" events in fiscal year 1986-87 at different locations throughout the county. The events were held on Saturdays. School parking areas were used primarily because they provide ample space and easy access. The county is required by the State of California to apply for a treatment, storage, and disposal facility (TSDF) permit variance prior to holding collection events.

Staffing requirements of the paint-collection events generally consisted of 8 member of the County Environmental Health Services' staff, 10 employees of the licensed waste management contractor hired for the program, and occasionally some high school student volunteers.

Although the 1986-1987 collections were advertised for paint collection only, residents brought other types of HHW. It was therefore decided to discontinue holding "paint only" collections and to collect paint on HHW collection days. Eighteen HHW collections were held in fiscal year 1987-1988, and 14 collections are scheduled for 1988-1989.

Paint Collection and Recycling--

In 1987, paint collected by the county was loaded onto a roll-off container. At a later date, the waste management company segregated the paints as either solvent-based or water-based and by light or dark color prior to consolidating them into 55-gallon drums.

The combined volume of about 6800 gallons of paint was collected in fiscal year 1986-87. Of that total, approximately 65 percent (4420 gallons) was water-based paint.

After the paint was consolidated, the county arranged to have the water-based (latex) paint reprocessed by A Major Paint Company, Inc., a subsidiary of Standard Brands, Inc. The paint was packaged into 5-gallon containers for reuse in the community. The cost associated with reprocessing the paint was approximately $2.00 per gallon.

The paint reprocessing process used by Standard Brands was a simple filtration process, which the county determined it could handle without the assistance of the paint company. The county currently has its HHW contractor, Alliance Technologies II, reprocess both latex- and solvent-based paints received during HHW collections. The paint is filtered through a wire-mesh strainer and segregated into light and dark colors before it is marketed.

In fiscal year 1987-1988, approximately 75 percent of the paint collected during county HHW collections was recycled. This percentage corresponds to approximately 97 tons (or 23,000 gallons) of paint.

Marketing the Product--

The reprocessed paint produced by Standard Brands was an interior/exterior product recommended for rough surfaces. The original intent was to make the reprocessed paint available to government agencies or nonprofit organizations. The Boy Scouts were the only nonprofit group that expressed an interest in the paint.

The Project Director of the San Diego County Department of Health Services paint program said that the following factors impeded the success of the redistribution effort:

- The color selection was limited to brown or beige.

- The quality of the paint was questioned, especially by government agencies.

- The reprocessed paint did not meet military specifications (the military is a large potential reprocessed paint purchaser in the region).

It was later decided that the paint would be included in the county cooperative auction that is held quarterly and is open to the public. In fiscal year 1987, all of the reprocessed paint was purchased by eight private contractors, acting independently, for an average price of $12 per 5-gallon pail.

The county currently sells the reprocessed paint at the county auction, or gives it away. Paint sold at the auction generates revenue of approximately $20 per 55-gallon drum. In fiscal year 1987-1988, reprocessed paint sales generated approximately $3000 in revenue, which compares favorably with the $2 per gallon the county had been paying Standard Brands to reprocess the paint. Solvent-based paint is given away in Mexico, as strict air quality standards prohibit its use as an outdoor paint in California.

Conclusions--

The county expects to continue its paint reprocessing and redistribution program. Although the revenues generated by the sale of reprocessed paint do not cover the costs of reprocessing, the Project Director stated that the program is considered cost-effective because of the funds saved by not having to dispose of the paint as hazardous waste. The county has not yet computed these net savings.

The county is also pleased with the final reprocessed paint product. Followup conversations with contractors that have purchased the paint and used it for a variety of internal and external painting projects indicate that the quality of the paint is satisfactory.

SECTION 6

TREATMENT AND DISPOSAL RESEARCH AND DEVELOPMENT

6.1 FACILITIES FOR RECYCLING

Existing and planned facilities for recycling, treatment, or disposal of HHW are briefly described here.

6.1.1 Batteries

The Mercury Refining Company, Inc., of Latham, New York, recovers mercury from batteries. Battery collection programs in places such as New York City and New Hampshire/Vermont have sent batteries to Mercury Refining.

Lead-acid batteries are recycled in the United States. Approximately 23 secondary lead smelters are operating in the United States today, down from more than 60 smelters in 1980. Because spent lead-acid batteries are the major raw material used by this industry, an incentive exists to see that lead-acid batteries are recycled and not disposed of in municipal landfills.

About 80 percent of used batteries are currently being recovered and recycled by the secondary lead industry, which recovers the lead and neutralizes the sulfuric acid. The plastics casings are recycled and sold back to plastics manufacturers, and the rubber is recovered or rendered nonhazardous and properly disposed of.

6.1.2 Oil

Although no oil recycling or treatment facilities are designed specifically for used oil generated by households, an active oil-recycling industry in the United States receives oil from both households and industry. The EPA has identified approximately 700 used-oil collection companies and 40 recycling companies that produce fuel oil from waste oil. According to a representative of the National Oil Recycling Association, most of these recyclers process less than 3 million gallons per year. The United States also has several oil re-refiners. A spokesperson for the Association of Petroleum Re-refiners reported that approximately 60 million gallons of used oil is re-refined each year in the United States.

6.1.3 Paint

Efforts have been made to recycle paint received during HHW collections. Particular interest has been shown in paint recycling because paint is

normally the item received in the largest volume (60 to 80 percent of the total) during HHW collections.

Philip Morley & Associates, in cooperation with the National Paint and Coatings Association, is conducting a project in Seattle, Washington, to explore opportunities for reprocessing latex paint received during HHW collections. In Phase 1 of this project, 660 gallons of latex paint brought to a collection site and sorted, and 285 gallons of light-shaded, nonlead-based paint that had not frozen, spoiled, or dried up were combined for reuse. The resulting product was a latex flat paint with an "institutional beige" color, which was appropriate for interior usage. When the paint was subjected to standard paint industry tests, it was deemed comparable to new paint in quality, based on viscosity and opacity tests. Although it did not tolerate scrubbing very well, it was stain resistant and adhered well to walls. It has an estimated shelf life of 6 months. The paint that has been used will be checked periodically for performance.

During Phase 2 of the project, pre- and post-sorted paints will be tested for the presence of priority pollutants. Project planners have concluded that continued paint recycling has great potential, but they will continue to study its efficacy and, particularly, its impact on the new-paint market.

Others have also been involved in paint reprocessing and redistribution. Three California counties (San Bernardino, San Diego, and San Francisco) recycle paint received during HHW collections. Latex paint collected at ongoing collection sites in San Bernardino County is submitted to a local manufacturer that uses the paint in the production of an industrial grade primer, which has been used by various county agencies. Solvent-based paint collected in the county is sent to a solvent recovery plant. After all the solvents are recovered, the waste sludge is incinerated.

6.1.4 Fluorescent Tubes

Some activity regarding the recovery of mercury from fluorescent tubes is taking place in the United States, including research and development of new technologies. The Mercury Refining Company of Latham, New York, recovers mercury from fluorescent tubes by using a retort process. Retorting involves crushing the tubes, placing them in pans, and indirectly heating them in 10-foot-long, stainless-steel, retort vessels. The mercury first passes through a condenser, where volatile materials are distilled out, and is then further purified before it is marketed.

Although no marketing figures were provided, an environmental engineer for the Mercury Refining Company noted that only a handful of drums are processed each year. This limited activity is due to the relative cost of the retort process. It takes the company roughly 48 hours to process a single 55-gallon drum at a cost of approximately $1200 per drum. Thus far, the suppliers of used fluorescent tubes have come from industry (not households), particularly companies in California, where regulations regarding mercury disposal are quite stringent.

The Mercury Refining Company is exploring more cost-effective processes for recovering mercury. One process would involve shaking the tubes in a manner that would facilitate the collection of the vibrating mercury.

Mech-Chem Associates, Inc., of Norfolk, Massachusetts is currently applying for a permit in California to construct a facility for recycling fluorescent tubes. The company plans to recover mercury and other materials from 2 to 4 million lamps per year.

The recovery process is called a "washing" technology. It involves crushing the lamps, washing the material to remove the mercury, and recovering the mercury through centrifuge, filtration, and distillation processes. Mech-Chem claims that this recovery technology is more cost-effective than European technologies and that recovery of 100 percent of the materials used in the tubes is possible. Although the company expects to charge suppliers for its acceptance of used tubes for recycling, the Company President expects the fee to be competitive when compared with the cost for disposal.

Mech-Chem may be in operation as early as the last quarter of 1989. It will target commercial suppliers of tubes, as 80 percent of the fluorescent tubes in this country are consumed by commercial markets. According to the President of Mech-Chem, the company will also be willing to process used tubes from households (the other 20 percent of the market) if communities will collect the tubes for them (e.g., via HHW collections).

6.1.5 Permanent HHW Collection Centers

Dana Duxbury & Associates identified 27 permanent HHW collection programs (programs operating at least once per month) in the United States. These are listed in Appendix C, Table C-1. Although the amount of HHW treatment at these facilities is not extensive, at least some of these centers consolidate collected products (e.g., paint) and neutralize some acids and bases. Both neutralization and consolidation are considered waste treatment in this country

6.1.6 Solvents

No U.S. solvent-recovery or treatment facilities are designed specifically for household solvents; however, HHW collection centers have sent used solvents to facilities that recover or treat industrial solvents. For example, the Sanitary Fill Company recycles solvents collected at its ongoing HHW collection facility in San Francisco, California.

6.2 R&D ACTIVITIES--MANAGEMENT AND SUBSTITUTUION OF HAZARDOUS SUBSTANCES IN CONSUMER PRODUCTS

This subsection briefly describes the research and development (R&D) activities that have been undertaken by industry, government agencies, and citizens' groups.

6.2.1 Citizens' Groups

The following groups have been involved in R&D:

- The League of Women Voters in Albany, New York, researched alternatives to commonly used hazardous household products and produced a book instructing consumers how to formulate and use alternative products.

- The National Coalition Against the Misuse of Pesticides (NCAMP) studies options for reducing pesticide usage. The Coalition promotes integrated pest management (IPM) programs as a means of promoting substitution of pesticides with nonchemical pest management practices.

- The National Toxics Campaign studies and advocates input substitution and end-product reformulation as a means of preventing the generation of hazardous waste, including HHW.

6.2.2 Government Agencies

The Congressional Office of Technology Assessment studied IPM, and produced a report in 1980 in which it was concluded that an IPM approach could reduce pesticide usage by as much as 75 percent in the United States.

6.2.3 Industry

The following are examples of industry's involvement in R&D regarding management and substitution of hazardous substances in consumer products:

- The Polaroid Corporation has worked to eliminate the use of mercury in its batteries. The company succeeded in reducing mercury by 50 percent during 1987, and had eliminated mercury from all of its battery production by April 1988.

- Pesticide manufacturers have worked to develop new pesticide formulations that are pest-specific and that do not build up in the environment or concentrate in the food chain. For example, at EPA's Second National Conference on HHWM, Dr. Robert Etter of the Chemical Specialties Manufacturers Associations claimed that the pesticide pyrethrin was developed as an insect-specific toxin that is effective in killing many insects but poses no threat to other animals, including humans.

6.3 CLEAN TECHNOLOGIES

The Mercantile Food Company of Georgetown, Connecticut, imports ECOVER products from Oostmalle, Belgium, into the United States. ECOVER manufactures products such as dishwashing liquids and laundry detergents that are labeled "ecologically safe" because of their biodegradability, the absence of phosphates, and the use of all-natural ingredients. Although these products

are not readily available in major supermarkets, they are sold in stores such as food co-ops.

Some consumers are using "home-brew" household products suggested by some government agencies and environmental groups as less hazardous alternatives to certain commercial products. For example the use of baking soda, water, and steel wool pads has been suggested as a substitute for commercial oven cleaners. A combination of baking soda and boiling water has been suggested as a replacement for commercial products that unclog drains. No known data were found on the extent to which the various lists of numerous suggested substitutes are actually used.

Rechargeable (nickel cadmium) batteries are in use in the United States, and despite the fact that nickel and cadmium wastes are considered hazardous wastes, these batteries could be viewed as a clean technology because they are rechargeable. The National Electrical Manufacturers Association (NEMA) would not release figures on U.S. sales of nickel-cadmium batteries.

6.4 FUTURE PERSPECTIVES ON HWW AND SQGS

Bans on the disposal of many hazardous wastes in landfills (including a ban on liquid hazardous wastes) are expected to promote treatment and disposal technologies that reflect the EPA hazardous waste hierarchy of reduction, reuse, recycling, treatment, and disposal. Thus, greater emphasis will be placed on the pretreatment and incineration of hazardous waste generated by households and small quantity generators.

In the area of research and development, growing attention will be placed on developing less hazardous products. Public health concerns about lead, cadmium, and other hazardous constituents in the waste stream, and concerns with regard to liability and waste site cleanup will also promote research and development of safer products. Companies such as Polaroid and General Electric have already undertaken successful R&D initiatives, and this trend is expected to continue.

REFERENCES

Porter, W. 1988. "Clarification of Issues Pertaining to Household Hazardous Waste Collection Program." Memorandum from the Assistant Administrator for Solid Waste and Emergency Response to U.S. Environmental Protection Agency Waste Management Division Directors. November.

University of California at Davis, 1987. Managing Hazardous Wastes Produced by Small Quantity Generators. Division of Environmental Studies, Sacramento, CA. April.

U.S. Environmental Protection Agency. 1986. Implementation Strategy for Small Quantity Generators of 100-1000 Kg/month. Office of Solid Waste, Washington, D.C. April.

APPENDIX A

ISWA Working Group on Hazardous Wastes

Survey on Household Hazardous Waste Management in Member Countries

Questionnaire

1. Problems

What substances and consumer products are considered hazardous ? Why are they considered household hazardous wastes ? *(Waste treatment infrastructure, emission control)*

As to commercial small quantity generators, which businesses and which hazardous wastes currently escape control ? Why ? *(Minimum quantities, lack of legislation)*

2. Policy approach

Is there any identified official policy or any legislative framework or management plan as to household hazardous wastes and small quantity generators in your country on a

- national/federal level
- regional level
- local/community level

If not, what are possibly the reasons ?

If so, please state the main elements of the policy or management plan with regard to the following keywords:

- Aims
- What wastes and what generators are concerned ? Please give definitions.
- Information activities *(product labelling, consumer advice, public awareness)*
- Is the policy based on compulsory regulation or voluntary activities ?
  - = If compulsory, what are the legal regulations ? *(banning of products and substances, restrictions, compulsory collection activities, shipment)*
  - = If voluntary, what initiatives can be identified ? *(e. g. by trade and industry, substitution of substances, waste audits)*

- Is the policy based on active, "front-end", or passive, "end-of-the-pipe" measures ?
  - = Active measures *(avoidance of hazardous components and products, substitution activities, clean technologies)*
  - = Passive measures *(e. g. separate collection, deposit schemes)*
- Future perspectives

3. Technical and organisational aspects

What institutions, organisations, and authorities are currently or potentially supporting household hazardous waste management ?

Are there promotion activities or subsidies for clean technologies or seperate collection of household hazardous wastes ?

4. Case studies

Case studies should provide detailed information on sucessful initiatives as to household hazardous wastes or small quantity generators that goes beyond general descriptions.

If possible, please state examples with reference to the following products considered hazardous in many countries:

- Batteries
- Waste oil
- Old drugs
- PVC

Any additional examples are appreciated. A further aspect that should be addressed are programs concerning small quantity generators *(e. g. metal plating, dry cleaning, surgeries, photo labs, motor repair shops etc.)*.

- Please give some general information on the local situation *(population, density, housing structure, city/rural area, waste collection and treatment)*
- Who became active ? *(authorities, trade and industry, environmentalists)*
- Organisation *(wastes or products concerned, collection system and collectors, treatment and disposal, economic incentives, deposit schemes)*
- Technology *(substitution activities, recycling technologies, treatment of collected wastes)*
- Information *(consumer advice, product labelling, information campaign, technical information for trade and industry, education in schools)*

- Legal framework *(compulsary or voluntary activity, taking-back obligation, banning of products or substances)*
- Results *(quantities and compostition of collected wastes, waste avoidance and collection efficiency, public response)*
- Costs

5. Treatment and disposal, research and development

Are there existing or planned facilities for recycling, treatment or disposal of household hazardous wastes ? *(recycling of batteries, fluorescent tubes, treatment of refrigerators etc)*

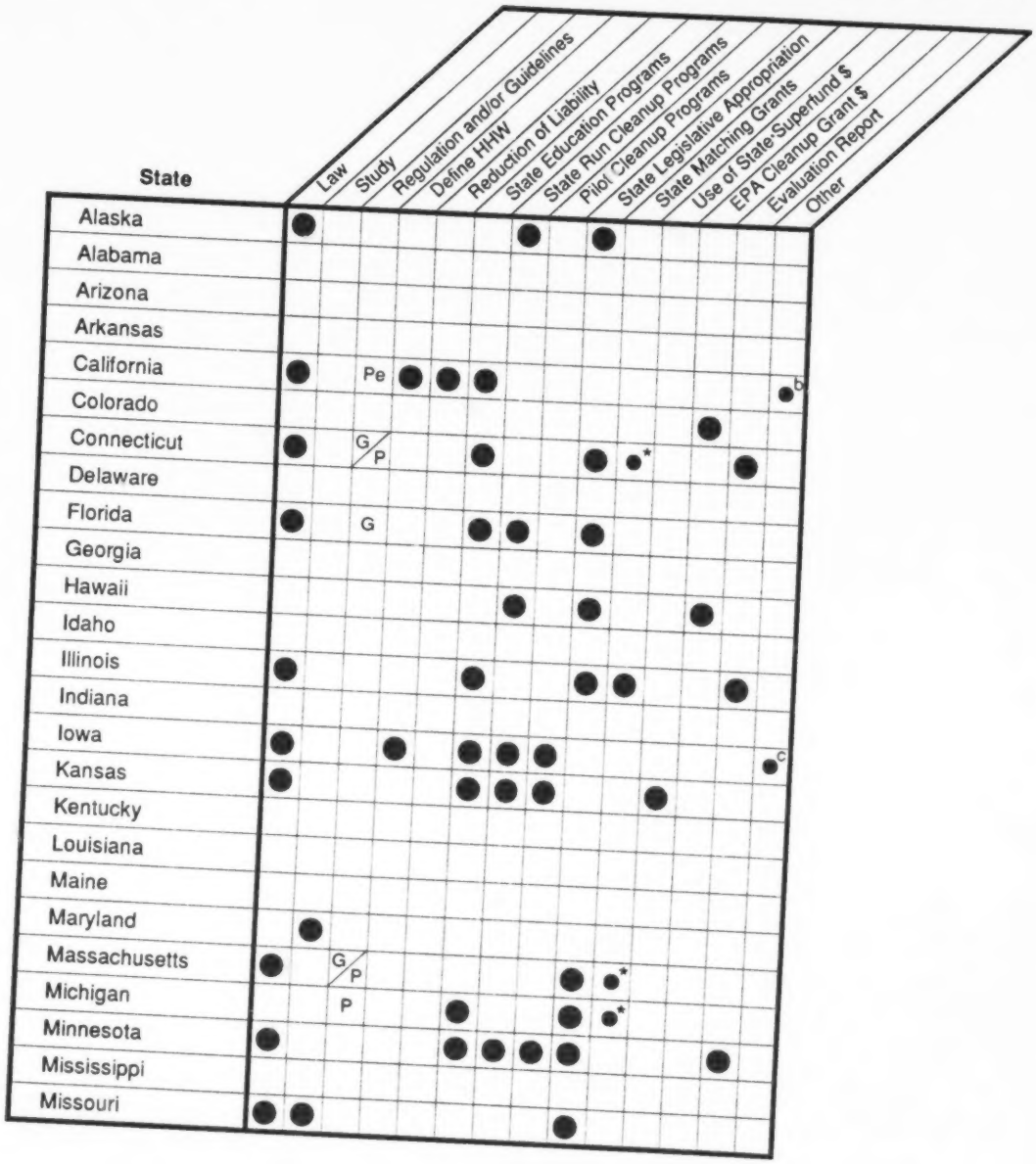
Are there research and development activities as to management and substitution of hazardous substances in consumer products ? What clean technologies are in use ?

What are the future perspectives in your country in the field of household hazardous wastes and small quantity generators ?

6. Comments

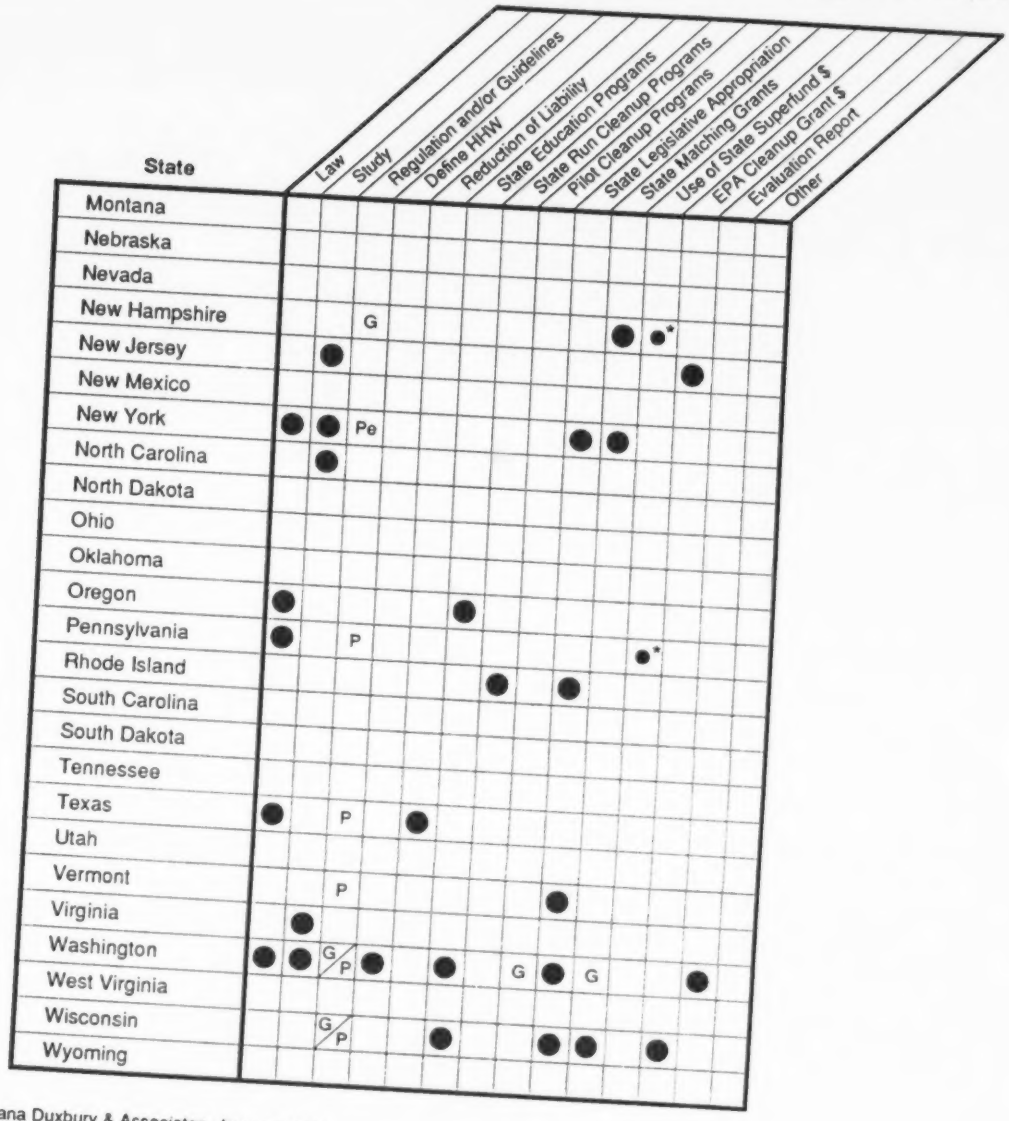
APPENDIX B

1981-1988 State Level Household Hazardous Waste Laws and Regulations [a]



APPENDIX B

1981-1988 State Level Household Hazardous Waste Laws and Regulations (cont'd)



[a] SOURCE: Dana Duxbury & Associates, January 1989

[b] State Solid Waste Superfund $ (State solid waste cleanup funds that have been applied to HHW management); Advisory Committe Report (Recommendations and evaluations of HHW activities by State-appointed HHW advisory committee).

[c] HHW Product Labeling (State regulations or guidelines that pertain to the labeling of hazardous household products); Retail Sales Permit Fee (Iowa requires retail stores that sell hazardous household products to purchase a permit, and revenues are used to fund HHW collections).

P = Program; G = Grants; Pe = Permanent
* = Funded in 1988
NOTE: Definitions of headings appear on the next page.

APPENDIX B

DEFINITIONS OF COLUMN HEADINGS (Note Some of these categories may overlap, and thus double-count State commitments)

Regulation and/or Guidelines — State regulations or guidelines pertaining to the definition and/or management of HHW.

Define HHW — Formal State definitions of HHW.

Reduction of Liability — Legislation or regulations designed to limit the liability of HHW collection program sponsors and managers.

State Education Programs — HHW education programs that are sponsored by State agencies.

State Run Cleanup Programs — HHW collections that are sponsored, managed, and funded by State agencies.

Pilot Cleanup Programs — Programs held on a one-time basis, often as a precursor to more permanent State commitment of resources and staff time funded with general revenues.

State Legislative Appropriation — General revenue appropriations approved by State legislatures to fund HHW management efforts.

State Matching Grants — State grants used for local HHW collections that match the funding commitment of the local sponsors.

Use of State Superfund $ — State hazardous waste cleanup funds that have been applied to HHW management.

EPA Cleanup Grant $ — Regional Offices of EPA have provided grant monies that have been used to fund HHW management programs.

Evaluation Report — Evaluation reports that were prepared to evaluate State-run pilot projects.

APPENDIX C

PERMANENT* HOUSEHOLD HAZARDOUS WASTE
COLLECTED PROGRAMS OPERATING IN 1988**

ALASKA

1. Anchorage, Alaska

Contact: Jim Sweeney, Program Manager, Municipality of Anchorage, P.O. Box 19650, Anchorage, AL 99519-6650, (907)561-1906.

General Information: Accepts HHW and Small Quantity Generator (SQG) waste at drop-off station or by appointment pick-up; built by municipality at at cost of $1.3 million.

Collection Site: Anchorage Regional Landfill with a drop-off station at the Central Transfer Station.

Date Established: February 1988.

CALIFORNIA

2. Monterery, California

Contact: Ms. Dulce Ledo, Monterey Regional Waste Management District, P.O. Box 609, Marina, CA 93933, (415)468-4114.

General Information: Open 5 days/week for HHW drop-offs; operated by Monterey Regional Waste Management District at an annual cost of $35,000; funded by tipping fees charged to landfill site users.

Collecion Site: Monterey landfill.

Date Established: January 1987.

3. San Bernardino, California

Contact: Diane Christensen, Environmental Specialist, San Bernardino County Health Department, 385 North Arrowhead Avenue, San Bernardino, CA 92415, (714) 387-4626.

General Information: First of six permanent sites in the country generally accepting only HHW; licensed treatment, storage, and disposal facility (TSDF) for the waste collected at this site and at the five satellite sites; open five weekdays per week with no appointment necessary; funded by landfill tipping fee.

Collection Site: San Bernardino TSDF.

Date Established: Spring 1985.

4. Fontana, California

Contact: Diane Christensen, Environmental Specialist, San Bernardino County Health Department, 385 North Arrowhead Avenue, San Bernardino, CA 92415, (714)387-4626.

General Information: One of five county satellite collection sites to the primary site in San Bernardino; open one weekend day/week; co-sponsored by fire department.

Collection Site: Fontana Fire Department.

Date Established: Spring 1985.

5. Redland, California

Contact: Diane Christensen, Environmental Specialist, San Bernardino County Health Department, 385 North Arrowhead Avenue, San Bernardino, CA 92415, (714)387-4626.

General Information: One of five county satellite collection sites to the primary site in San Bernardino; open one weekend day/week; co-sponsored by fire department.

Collection Site: Redland City Yard.

Date Established: Spring/Summer 1987.

6. Barstow, California

Contact: Diane Christensen, Environmental Specialist, San Bernardino County Health Department, 385 North Arrowhead Avenue, San Bernardino, CA 92415, (714)387-4626.

General Information: One of five county satellite collection sites to the primary site in San Bernardino; open one weekend day/week; co-sponsored by fire department.

Collection Site: Barstow Fire Department.

Date Established: Spring/Summer 1987.

7. Rancho Cucamonga, California

Contact: Diane Christensen, Environmental Specialist, San Bernardino County Health Department, 385 North Arrowhead Avenue, San Bernardino, CA 92415, (714)387-4626.

General Information: One of five county satellite collection sites to the primary site in San Bernardino; open one weekend day/week; co-sponsored by fire department.

Collection Site: Rancho Cucamonga Fire Department.

Date Established: Spring/Summer 1987

8. Victorville, California

Contact: Diane Christensen, Environmental Specialist, San Bernardino County Health Department, 385 North Arrowhead Avenue, San Bernardino, CA 92415, (714)387-4626.

General Information: One of five county satellite collection sites to the primary site in San Bernardino; open one weekend day/week; co-sponsored by fire department.

Collection Site: Victorville Fire Department.

Date Established: Spring/Summery 1987.

9. San Franciso, California

Contact: Larry Sweetser, Environmental Compliance Program Manager, Sanitary Fill Company, 501 Tunnel Avenue, San Francisco, CA 94134, (415)468-2442.

General Information: Licensed treatment storage and disposal facility operated by Sanitary Fill Co. in cooperating with the San Francisco Health Commission and Chief Administrative Office; open 3 days per week for HHW only; funded by solid waste tax on residents' monthly bill.

Collection site: Household Hazardous Waste Collection Facility (HHWCF) at San Francisco Solid Waste Transfer Station.

Date Established: January 21, 1988.

10. Santa Monica, California

Contact: Deborah Bain, Recycling Division, City of Santa Monica, 1685 Main Stree, Santa Monica, California 90401, (213)458-8526.

General Information: Operates Monday-Saturday from 8:00 AM to noon; accepts only HHW; funded through city's general fund for the first year.

Collection site: City Department of Public Works maintenance yard.

Date Established: November 14, 1988.

FLORIDA

11. Volusia, Florida

Contact: Lindalee Anderson, Environmental Specialist, Volusia Environmental Management Deparment, 123 W. Indiana Avenue, DeLand, Florida, (904)736-5927.

General Information: Collect HHW and conditionally exempt SQG waste on different days, once per month, bu appointment for the conditionally exempt SQGs. May start a pick-up waste collection for the conditionally exempt SQGs.

MASSACHUSSETTS

12. Martha's Vineyard, Massachusetts

Contact: Kate Gage, Program Coordinator/Planner, Martha's Vineyard Refuse Disposal District, P.O. Box 2248, Oak Bluffs, MA 02887, (508)693-3479.

General Information: Fixed site managed by the Refuse District and North East Solvents; funded by the District and by a state grant; currently accepts only household waste, though is expected to expand to also accept waste from regulated very small quantity hazardous waste generators (VSOGs); open one or two days per month.

Collection Site: Trailer on the grounds of the Town Wastewater Treatment Plant.

Date Established: August 27, 1988.

MICHIGAN

13. Kalamazoo County, Michigan

Contact: Tom Dewhirst, Kalamazoo County Human Services, Household Hazardous Waste Coordinator, 418 West Kalamazoo Avenue, Kalamazoo, MI 49007, (616)383-8863.

General Information: Accepts only HHW by appointment once per month; funded by County and business contributions; discourages smoke detector, latex paint, motor oil, and car batteries.

Collection Site: Usually at the Kalmazoo County Fairgrounds.

Date Established: July 29, 1988.

14. Washenaw County, Michigan

Contact: Steven Manville, HHW Program Coordinator, County Health Department, 2355 West Stadium, P.O. Box 8645, Ann Arbor, MI 48107, (313)994-2494.

General Information: Accepts only HHW by appointment at mobile sites; discourages smoke detectors, latex pains, motor oil, and car batteries; receives approximately 40 participants at a cost of about $2600 per collection.

Collection Site: Health Department parking lot.

Date Established: May 1988.

15. Kent County, Michigan

Contact: Donna Engstrom, Kent Country, DPW, 1500 Scribner North West, Grand Rapids, MI 49504, (616)774-6892.

General Information: Accepts only HHW by appointment; discourages smoke detectors, latex paint, motor oil, and car batteries; funded by the Department of Public Works and manged jointly with Health Department; operating once per month and attracting approximately 50 participants per month.

Collection Site: Garage of DPW Road Commission Building.

Date Established: April 28, 1988.

16. Ingham County, Michigan

Contact: Bob Ceru, Supervisor, Toxic Materials & Hazardous Waste, Ingham County Health Department, P.O. Box 30161, Lansing, MI 48909, (517)887-6988.

General Information: Accepts only HHW by appointment; funded by an EPA grant and the county; recycles paints and automotive products on site; discourages smoke detector, latex paint, motor oil, and car bateries; operating from a fixed site at a cost of approximately $45 per household.

Collection Site: Health Department Garage.

Date Established: September 1986.

17. Macomb County, Michigan

Contact: Robert MacDonald, Program Development, Environmental Health Planner, Macomb County Health Department, 43525 Elizabeth Rd, Mt. Clemens, MI 48043, (313)469-5236.

General Information: Accepts HHW 5 days/week by appointment at not charge; funded by the EPA and the state Natural Resource Department.

Collection Site: Elizabeth Road Storage Site.

Date Established: February 5, 1988.

MINNESOTA

18. Lyon County, Minnesota

Contact: Ned Brooks, Pollution Control Specialist, MPCA-Hazardous Waste Division, 520 Lafayette Road, North St. Paul, MN 55155, (612)296-6300.

General Information: Accepts only HHW, 1/2 day per week; no appointment necessary; paint exchange at collection site; latex paint discouraged; state trains local residents to staff the collection; funded by county with matching state grant.

Collection site: Highway Department Garage in Marshall, MN.

Date Established: November 1988.

19. Duluth, Minnesota

Contact: Ned Brooks, Pollution Control Specialist, MPCA-Hazardous Waste Division, 520 Lafayette Road, North St. Paul, MN 55155, (612)296-6300.

General Information: Accepts only HHW, 1/2 day per week; no appointment necessary; paint exchange at collection site; latex paint discouraged; state trains local residents to staff the collection; funded by county with matching state grant.

Collection site: Duluth landfill transfer station/sewage plant/ incinerator site.

Date Established: May 1987.

20. Kandyiohi County, Minnesota

Contact: Ned Brooks, Pollution Control Specialist, MPCA-Hazardous Waste Division, 520 Lafayette Road, North St. Paul, MN 55155, (612)296-6300.

General Information: Accepts only HHW, 5 days per week; no appointment necessary; paint exchange at collection site; latex paint discouraged; state trains local residents to staff the collection; funded by county with matching state grant.

Collection site: Landfill storage building in New London, MN

Date Established: June 1988.

NEW YORK

21. Southold, New York

Contact: Jim McMahon, Southold Town Hall, Main Road, Southold, NY 11971, (516)765-1892.

General Information: Accepts HHW as well as hazardous waste from small businesses, schools, etc. at no charge, with no appointment necessary; fixed site built with state funding at $23,000 start-up cost and managed by town with town funds.

Collection Site: Southold landfill.

Date Established: June 1988.

VIRGINIA

22. Arlington, Virginia

Contact: Tanya Spano, Process Control Engineer, WPC Plant, 3401 S. Glebe Rd., Arlington, Virgina, (703)684-6607.

General Information: Accepts only HHW; operated by the Water Pollution Control Plant for Arlington; funded by county; drop-off by appointment.

Collection Site: Water Pollution Control Plant.

Date Established: 1986.

WASHINGTON

23. Whatcomb County, WA

Contact: Dave Bader, Whatcomb County Health Department, P.O. Box 935, Bellingham, WA 98227, (260)676-6724.

General Information: Accepts HHW by appointment during regular working hours; program is run by County Health and Solid waste Departments and funded by solid waste budget.

Collection Site: Waste collected at shed at city central shops.

Date Established: 1982.

24. Thurston County, Washington

Contact: Marie Zurofke, County Health Department, 2000 Lakeridge Drive, Olympia, WA 98502, (206)786-5459.

General Information: Accepts only HHW; funded by County Public Works and Environmental Health Departments from a solid waste tipping fee; start-up costs, including the construction of a small building; approximately $20,000; accept waste without appointment every Saturday; currently do not advertise the collection service because facility would be overwhelmed, but expansion is expected.

Collection Site: Building situation at Thurston County Landfill.

Date Established: March 1987.

25. Georgetown, Washington

Contact: Kathy Buller, Chemical Processors, Inc. 2203 Airport Way, South, Seattle, WA 98134, (206)223-0500.

General Information: HHW only accepted as a public service by Chemical Process at no charge; operating 1 day/week; accept non-extremely hazardous SQG waste at a fee as of February 1989.

Collection Site: Chemical Processors commercial TSD facility in Georgetown (outside of Seattle).

Date Established: 1982.

26. Washougal, Washington

Contact: Kathy Buller, Chemical Processors, Inc. 2203 Airport Way, South, Seattle, WA 98134, (206)223-0500.

General Information: HHW only accepted as a public service by Chemical Process at no charge; operating 1 day/week; accept non-extremely hazardous SQG waste at a fee as of February 1989.

Collection Site: Chemical Processors commercial McClary Columbia TSD facility in Washougal.

Date Established: June 1988.

27. Seattle/King County, Washington

Contact: Wallace Swofford, Environmental Health Supervisor, Seattle/King County Department of Public Health, 172 20th Avenue, Seattle, WA 98122, (206)296-4633.

General Information: Collects pesticides (targets banned pesticides) from households at 5 sites, 5 days per week, by appointment; funded by county and city; county is phasing out program as new permanent sites and mobile facilities are in the planning stages.

Collection Site: 5 sites in the county.

Date Established: 1982.

* A permanent collection program is defined as a program that accepts HHW at least once per month.

** Source: Dana Duxbury & Associates, 1989.

GLOSSARY

CERCLA - Comprehensive Environmental Response Compensation and Liability Act. This national law applies to hazardous waste site cleanup, emergency response, and chemical release reporting. Commonly known as "Superfund".

CSMA - Chemical Specialities Manufacturers Association.

DEM of Massachusetts - Massachusetts Department of Environmental Management. Environmental planning agency for Massachusetts.

DEQE - Department of Environmental Quality Engineering. State environmental enforcement agency for Massachusetts.

DIY - Do-it-yourself oil changer.

EPA - United States Environmenal Protection Agency. This national agency oversees environmental protection programs.

EP toxicity - Extraction Procedure toxicity. An EP toxicity test is designed to simulate leaching conditions that might occur in a landfill.

FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act.

GRCDA - Governmental Refuse Collection and Disposal Association.

HHWM - Household Hazardous Waste Management.

HSWA - Hazardous and Solid Waste Amendments. HSWA amended RCRA.

IMP - Integrated pest management.

LQG - Large quantity generator of hazardous waste.

MPCA - Minnesota Pollution Control Agency.

NCAMP - National Coalition Against the Misuse of Pesticides.

NEMA - National Electrical Manufacturers Association.

NPCA - National Paint and Coatings Association.

NPL - National Priorities List. List of sites prioritizied for hazardous waste cleanup under CERCLA.

OPEC - Organization of Petroleum Exporting Countries.

ORD - EPA Office of Research and Development.

OSHA - Occupational Safety and Health Administration.

OTA - Congressional Office of Technology Assessment.

PCBs - Polychlorinated Biphenyls.

POTW - Publicly Owned Treatment Works. A POTW is a muncipal wastewater treatment facility.

RCRA - Resource Conservation and Recovery Act. RCRA is a national hazardous and solid waste management law.

RITTA - RCRA Integrated Training and Technical Assistance Grants Program.

SARA - Superfund Amendments and Reauthorization Act. SARA amends CERCLA.

SQG - Small quantity generator of hazardous waste.

TSDF - Treatment, storage, and disposal facility for hazardous waste.

VSQG - Very small quantity generator of hazardous waste.